Naval Research Laboratory

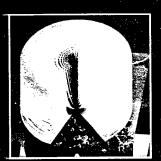
























NRL FACT BOOK





Celebrating 75 Years

19991101 015

The *NRL Fact Book* is prepared every two years as a reference source for information about the Naval Research Laboratory (NRL). To provide additional information to the reader, a point of contact is listed for each activity.

NRL has a continuing need for physical scientists, mathematicians, engineers, and support personnel. Vacancies are filled without regard to age, race, creed, sex, or national origin. Information concerning current vacancies is furnished on request. Address all such inquiries to:

Human Resources Office Staffing and Classification Branch (Code 1810) Naval Research Laboratory Washington, DC 20375-5320

Front cover: All images on the front cover except 6 and 10 were winners of the NRL Science As Art Contest that was conducted as part of NRL's 75th Anniversary celebration.





















- 1. First United States reconnaissance satellite system, the Galactic Radiation and Background (GRAB) satellite system
- 2. Multispectral IR image of a truck viewed in the afternoon using two MRIR bands and one LWIR band
- In an effort to improve Naval firefighting procedures, an experimental study was performed to develop safe, reproducible full-scale tests as a basis to study the development and mitigation of Class B backdraft explosions.
- 4. This image depicts transmission loss using the Radio Physical Optics model in the Aegean Sea.
- This umbrella-shaped cirrate octopod was immortalized in about 2310 m of water during the 1996 geophysical expedition to the Norwegian-Greenland Sea. A deep-tow Benthos camera system was used.
- 6. Bust of Thomas Edison appears at NRL's main entrance. NRL began operations in 1923 as a result of Thomas Edison's vision for the nation's need of "...a great research laboratory..."
- The result of an investigation where polycrystalline powder of chemically altered tartaric acid was examined at 90 °C under an optical microscope
- Three-dimensional antenna pattern of a fire-control radar aboard a *Burke*-class ship. This frame is from an animated visualization of data from an at-sea test of the fire control system.
- 9. Artist's rendering of the Deep Space Program Science Experiment (DSPSE), otherwise known as *Clementine*, which generated 1.8 million images of the moon.
- 10. An NRL P-3 flies by Building 43 on the actual day of NRL's 75th anniversary, July 2, 1998. Mounted on top of this building is a 50-ft radio telescope dish, which has become the unofficial symbol of NRL. Originally constructed in 1951 and modified in 1958, scientists called it the first "accurately figured radio telescope in the world."

NRL's URL: http://www.nrl.navy.mil/

Quick Reference Telephone Numbers

	NRL	NRL-	NRL-	NRL CBD	NRL FSD Patuxent River
	WASHINGTON	SSC	MONTEREY	CBD	ratuxent niver
Hotline	(202) 767-6543	(228) 688-5001	(831) 656-4721	(202) 767-6543	(301) 342-4926
Personnel Locator	(202) 767-3200	(228) 688-3390	(831) 656-4731	(410) 257-4000	(301) 342-4926
DSN	297- or 754-	485	878	_	342
Direct-in-Dialing	767- or 404-	688	656	257	342
Public Affairs	(202) 767-2541	(228) 688-5328	(831) 656-4708	_	(301) 342-4926

NAVAL RESEARCH LABORATORY WASHINGTON, DC 20375-5320

Contents

1	INTRODUCTION TO THE NAVAL RESEARCH LABORATORY
1	Mission
3	The Naval Research Laboratory in the Department of the Navy
4	NRL Functional Organization
5	Current Research
8	Major Research Capabilities and Facilities
14	NRL Sites and Facilities
15	EXECUTIVE DIRECTORATE
17	Executive Directorate - Commanding Officer and Director of Research
20	Executive Council
21	Research Advisory Committee
25	Office of Program Administration and Policy Development
26	Command Support Division
28	Military Support Division
30	Flight Support Detachment
32	Human Resources Office
35	BUSINESS OPERATIONS DIRECTORATE
38	Associate Director of Research for Business Operations
41	Office of Counsel
42	Contracting Division
44	Financial Management Division
46	Supply Division
48	Research and Development Services Division
51	SYSTEMS DIRECTORATE
54	Associate Director of Research for Systems
57	Signature Technology Office
58	Technical Information Division
60	Radar Division
62	Information Technology Division
64	Optical Sciences Division
66	Tactical Electronic Warfare Division
69	MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE
72	Associate Director of Research for Materials Science and Component Technology
<i>7</i> 5	Laboratory for Structure of Matter
76	Chemistry Division
78	Materials Science and Technology Division
80	Laboratory for Computational Physics and Fluid Dynamics
82	Plasma Physics Division
84	Electronics Science and Technology Division
86	Center for Bio/Molecular Science and Engineering

89	OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE
92	Associate Director of Research for Ocean and Atmospheric Science
0.4	and Technology
94	Office of Research Support Services
96	Acoustics Division
98	Remote Sensing Division
100	Oceanography Division
102	Marine Geosciences Division
104	Marine Meteorology Division
106	Space Science Division
109	NAVAL CENTER FOR SPACE TECHNOLOGY
112	Director of Naval Center for Space Technology
114	Space Systems Development Department
116	Spacecraft Engineering Department
119	TECHNICAL OUTPUT, FISCAL, AND PERSONNEL INFORMATION
121	Technical Output
122	Fiscal
126	Personnel Information
127	PROFESSIONAL DEVELOPMENT
129	Programs for NRL Employees
133	Programs for Non-NRL Employees
100	1 logiants for twon-twee Employees
135	GENERAL INFORMATION
137	Maps
144	Key Personnel

Photos on opposite page - top to bottom

The Naval Research Laboratory is located in Washington, DC, on the east bank of the Potomac River.

The NRL Marine Meteorology Division is located in Monterey, California (NRL-MRY).

The Naval Research Laboratory Detachment is located at Stennis Space Center, Bay St. Louis, Mississippi (NRL-SSC).

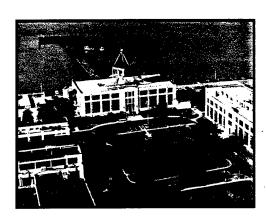
Introduction to the Naval Research Laboratory

Mission

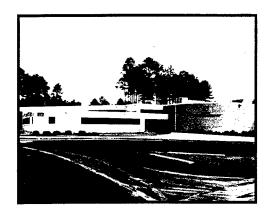
To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems, and ocean, atmospheric, and space sciences and related technologies.

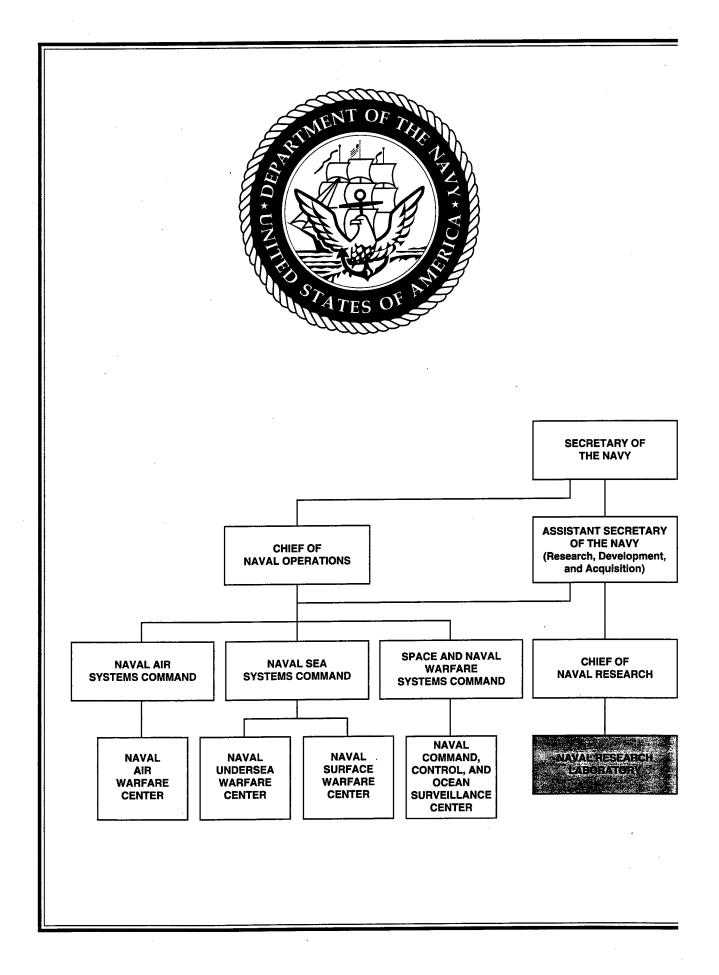
The Naval Research Laboratory

- Provides primary in-house research for the physical, engineering, space, and environmental sciences
- Provides broadly based exploratory and advanced development programs in response to identified and anticipated Navy needs
- Provides broad multidisciplinary support to the Naval Warfare Centers
- Provides space and space systems technology development and support
- Assumes responsibility as the Navy's corporate Laboratory











The Naval Research Laboratory in the Department of the Navy

The Naval Research Laboratory is the Department of the Navy's corporate laboratory; it is under the command of the Chief of Naval Research (CNR). As the corporate laboratory of the Navy, NRL is the principal in-house component in the Office of Naval Research's effort to meet its science and technology responsibilities.

NRL has had a long and fruitful relationship with industry as a collaborator, contractor, and most recently in Cooperative Research and Development Agreements (CRADAs). NRL values this linkage and intends for it to continue to develop.

NRL is an important link in the Navy RD&A chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in industry and the academic community throughout the world and provides an effective coupling point to the R&D chain for the Office of Naval Research (ONR).

NRL Functional Organization



COMMANDING OFFICER Code 1000 CAPT B.W. Buckley, USN



DIRECTOR OF RESEARCH Code 1001 Dr. T. Coffey

CHIEF STAFF OFFICER Code 1002 CAPT G.G. Brown, USN



- Safety
- Security
- Flight Detachment
- MILOPS
- MILPERS
- . Management Control and Review
- Public Affairs

HUMAN **RESOURCES** OFFICE Code 1800 Ms. B.A. Duffield*



- Equal Employment Opportunity
- Staffing and Classification
- Employee Development
- Employee Relations

BUSINESS **OPERATIONS** Code 3000 Mr. D.K. Therning*

• Financial Management

· Research and Development

· Chesapeake Bay Section

Legal Counsel

Services

Contracts

Supply



SCIENCE AND COMPONENT **TECHNOLOGY** Code 6000

Dr. B.B. Rath

MATERIALS



- · Laboratory for Structure of Matter
- Chemistry
- · Materials Science and Technology
- · Laboratory for Computational Physics and Fluid Dynamics
- Plasma Physics
- Electronics Science and Technology
- Center for Bio/Molecular Science and Engineering

NAVAL CENTER FOR SPACE **TECHNOLOGY** Code 8000 Mr. P.G. Wilhelm



- Space Systems Development
- Spacecraft Engineering

SYSTEMS Code 5000 Dr. R.A. LeFande



- Signature Technology Office
- Technical Information
- Radar
- Information Technology
- Optical Sciences
- Tactical Electronic Warfare

OCEAN AND **ATMOSPHERIC** SCIENCE AND **TECHNOLOGY** Code 7000 Dr. E.O. Hartwig



- Research Support Services
- Acoustics
- Remote Sensing
- Oceanography
- Marine Geosciences
- Marine Meteorology
- Space Science

^{*}Acting

Current Research

The following areas represent broad fields of NRL research. Under each, more specific topics that are being investigated for the benefit of the Navy and other sponsoring organizations are listed. Some details of this work are given in the *NRL Review*, published annually. More specific details are published in reports on individual projects provided to sponsors and/or presented as papers for professional societies or their journals.

Advanced Radio, Optical, and IR Sensors

Advanced optical sensors

EO/MET sensors

Satellite meteorology

Precise space tracking

Radio/Infrared astronomy

Infrared sensors and phenomenology

Middle atmosphere research

Image processing

VLBI/Astrometry

Atmospheric effects on low frequency EM

communications

Optical interferometry

Imaging spectrometry

Computer Science and Artificial Intelligence

Standard computer hardware, development environments, operating systems, and runtime support software

Methods of specifying, developing, documenting, and maintaining software

Human-computer interaction

Intelligent systems for resource allocation, signal identification, operational planning, target classification, and robotics

Parallel scientific libraries

Algorithms for massively parallel systems

Digital progressive HDTV for scientific visualization

High-performance, all-optical networking

Machine learning

Advanced computer networking

Simulation management software for networked high performance computers

Algorithms for incorporating environment and communication systems performance into simulations

Interactive 3-D visualization tools and applications

Distributed interactive simulations

Computational steering

Directed Energy Technology

High-energy lasers Chemical lasers Laser propagation High-power microwave sources

RAM accelerators

Pulse detonation engines

Charged-particle devices

Pulse power

DE effects

Electronic Electro-optical Device Technology

Integrated optics

Radiation-hardened electronics

Nanotechnology

Microelectronics

Microwave and MM wave technology

Hydrogen masers for GPS

Aperture syntheses

Electric field coupling

Vacuum electronics

Focal plane arrays

Infrared sensors

Electronic Warfare

EW/C2W/IW systems and technology

COMINT/SIGINT technology

EW decision aids, and planning/control systems

Intercept receivers, signal processing, and

identification systems

Passive direction finders

Decoys and offboard CM (RF and IR)

Expendable autonomous vehicles

Repeaters/jammers and EO/IR active countermeasures and techniques

measures and techniques

Platform signature measurement and management

Threat and EW systems computer modeling and simulations

Visualization and virtual reality

Hardware-in-the-loop and flyable simulators

Missile warning infrared countermeasures

RF environment simulators

EO/IR multispectral/hyperspectral surveillance

Enhanced Maintainability, Reliability, and Survivability Technology

Coatings

Friction/wear reduction

Water additives and cleaners

Fire safety

Laser hardening
Satellite survivability
Corrosion control
Automation for reduced manning
Radiation Effects
Mobility fuels
Chemical and biological sensors
Environmental compliance

Environmental Effects on Naval Systems

Meteorological effects on electro-magnetic/ electro-optical system performance Meteorological effects on weapons, sensors, and

platforms

Air quality in confined spaces

Electromagnetic background in space

Solar and geomagnetic activity

Magnetospheric and space plasma effects

Nonlinear science

Ionospheric behavior

Oceanographic effects on weapons, sensors, and platforms

Electromagnetic, electro-optical, and acoustic system performance/optimization

Environmental hazard assessment

Contaminant transport

Imaging Research/Systems

Remotely sensed signatures analysis Real-time signal and image processing algorithms/systems

Image data compression methodology

Image fusion

Automatic target recognition

Scene/Sensor noise characterization

Image enhancement/noise reduction

Scene classification techniques

Radar and laser imaging systems studies

Coherent/Incoherent imaging sensor exploita-

Remote sensing simulation

Hyperspectral imaging

Microwave polarimetry

Information Technology

Antijam communication links

Next generation, signaled optical network

architectures

Integrated voice and data

Arctic communication links

Information security (INFOSEC)

Voice processing

High performance computing

High performance communications

Requirement specification and analysis

Real-time computing

Tactical/warfighter's internetworking

Natural environments for distributed simulation

Collaborative engineering environments

Information filtering and fusion

Integrated internet protocol (IP) and asynchronous transfer mode (ATM) multicasting

High assurance software

Distributed network-based battle management

Teraflop scalable shared memory, massively

parallel computer architectures

Distributed, secure, and mobile information

infrastructures

Virtual engineering

Simulation based virtual reality

Advanced distributed simulation

High-end, progresive HDTV imagery distribution

Defensive information warfare

Augmented reality

Marine Geosciences

Geoacoustic modeling in support of acoustic performance prediction

Marine seismology, including propagation and noise measurement

Geomagnetic modeling in support of nonacoustic system performance prediction

Geotechnology/sediment dynamics affecting mine warfare and mine countermeasures

Mapping and charting, including advanced seafloor mapping, imaging systems, and innovative object-oriented digital mapping models, techniques, and databases

Static potential field measurement and analysis (gravity and magnetic)

Foreshore sediment transport

Materials

Superconductivity

Magnetism

Bio/Molecular engineering

Materials processing

Advanced alloy systems

Solid free form fabrication

Environmental effects

Energetic materials/explosives

Aerogels

Nano-scale materials

Non-destructive evaluation

Ceramics and composite materials

Thin film synthesis and processing

Electronic and piezoelectric ceramics

Thermoelectric materials

Metamorphic materials/smart structures

Computational material science

Paints and coatings

Flammability

Meteorology

Global, theater, tactical-scale, and on-scene numerical weather prediction

Data assimilation and physical initialization Atmospheric predictability and adaptive observations

Adjoint applications

Marine boundary layer characterization

Air/sea interaction; process studies

Coupled air/ocean/land model development

Tropical cyclone forecasting aids

Satellite data interpretation and application

Aerosol transport modeling

Meteorological applications of artificial intelligence and expert systems

On-scene environmental support system development

Tactical data base development and applica-

Meteorological tactical decision aids

Meteorological simulation and visualization

Ocean Acoustics

Underwater acoustics, including propagation, noise, and reverberation

Fiber-optic acoustic sensor development

Deep ocean and shallow water environmental acoustic characterization

Undersea warfare system performance modeling, unifying the environment, acoustics, and signal processing

Target reflection, diffraction, and scattering

Acoustic simulations

Tactical decision aids

Sonar transducers

Oceanography

Oceanographic instrumentation

Open ocean, littoral, and nearshore oceanographic forecasting

Shallow water oceanographic effects on operations

Arctic environmental quality

Modeling, sensors, and data fusion

Bio-optical and fine-scale physical processes

Bio-corrosion

Oceanographic simulation and visualization

Coastal scene generation

Waves, tides, and surf prediction

Coupled model development

Coastal ocean characterization

Oceanographic decision aids

Global, theater, and tactical scale modeling

Remote sensing of oceanographic parameters

Satellite image analysis

Space Systems and Technology

Space and ground systems implementation, from concept through orbital operations

Advanced space systems architectures and requirements

Systems engineering and analysis

Mission evaluation and performance assessment Spacecraft controllers, processors, signal processing, and software

Astrodynamics, mathematical modeling, and simulations

Surveillance sensing technology and applications Satellite communications theory and systems

Tactical communications systems

Mobile data collection, processing, and dissemination

Spacecraft electronics design, engineering, and integration

Satellite ground station, tracking, telemetry, control systems design, and software

Precise time and time interval technology

Navigation satellite technology and frequency standards

Remote sensing, calibration, and research Spacecraft electrical power and radio frequency systems

Surveillance and Sensor Technology

Point defense technology

Imaging radars

Surveillance radars

Multifunction RF systems

Target classification/identification

Airborne geophysical studies

Fiber-optic sensor technology

Undersea target detection/classification

EO/IR multispectral/hyperspectral detection and classification

Sonar transducers

Electromagnetic sensors—gamma ray to rf wavelengths

SQUID for magnetic field detection

Low observables technology

Ultra-wideband technology

VHSIC/MIMIC applications

Interferometric imagery

Micro-sensor system

Digital framing resonnaissance canvas

Undersea Technology

Autonomous vehicles

Bathymetric technology

Anechoic coatings

Acoustic holography

Unmanned undersea vehicle dynamics

Weapons launch



Major Research Capabilities and Facilities

(Listed alphabetically by organizational unit)

Acoustics Division (Code 7100)

Large, sandy-bottom, holographic pool facility for investigating echo characteristics of underwater buried/near bottom targets and sediment acoustics

Multichannel programmable acoustic signal processing system

Containerized data processing for acoustic array processing at remote sites and aboard ship

One million gallon, vibration-isolated underwater holographic/3-D laser vibrometer facility for studying structural acoustic phenomena for submarine, mine countermeasure and torpedo systems

In-air structural acoustics facility with high spatial density nearfield acoustic holography and 3-D laser vibrometer measurements and processing systems for diagnosing large structures including aircraft interiors and rocket payload fairings

High-powered sound source array

Moored acoustic array with satellite telemetry channels for measuring directional noise

Multiple-towed acoustic arrays with up to 144 acoustic channels for measuring directional noise

Twin underwater towers supporting sources and hydrophone arrays to measure highfrequency propagation, volume, and boundary scattering in shallow water

High-speed maneuverable towed body with MK-50 and synthetic aperture sonars to measure high-frequency boundary scattering and coherence

Tactical oceanography simulation laboratory Digital Acoustic Buoy Systems (DABS), which can autonomously record data from vertical and/or horizontal acoustic arrays, providing the capability to (1) make long-term ambient noise measurements uncontaminated by the noise of a nearby ship and (2) make single ship propagation measurements

Acoustic Communications Simulation Laboratory

20-ft by 20-ft by 10-ft deep above-ground saltwater acoustic tank facility with environmental control and substantial optical access

Center for Bio/Molecular Science and Engineering (Code 6900)

Optical equipment
Confocal fluorescent microscope

CW fluorimeter and microscope

Excimer laser projection exposure system

Dektak surface profilometer

Optical and fluorescence microscopes

Photon correlation spectrometer

Picosecond dye laser system

Raman spectrometers

Scanning and transmission electron microscope

SLM fluorimeter (visible through near IR) Time resolved fluorimeter (nanosecond)

UV-visible absorption spectrophotometers

Analytical instruments

Atomic force/scanning tunnelling microscope

Capillary electrophoresis unit

Contact angle goniometer

Differential scanning calorimeter

GC/MASS spectrometer

DNA synthesizer; DNA sequencer

HPLC

Patch clamp microelectrodes

Potentiometer for electrochemistry

General facilities

Class 100 clean room

Cold room for storage and preparation

Controlled shelf temperature lyophilizer

Silicon graphics IRIS workstation

Freeze-fracture apparatus

High-speed ultracentrifuges

Inert atmosphere dry box

Langmuir-Blodgett film balance

Chemistry Division (Code 6100)

Synthesis/processing facilities

Marine corrosion facility (at Key West, Florida)

Paint formulation and coating

Functional polymers/elastomers

Langmuir-Blodgett film

Surface cleaning

Thin film deposition/etching with in-situ control

Characterization facilities

General purpose chemical analysis

Surface diagnostics

Nanometer scale composition/structure/ properties

Magnetic resonance NDI

Tribology

Polymer structure/function

Special purpose capability

Environmental monitoring/remediation
Synchrotron interfacial spectroscopy/
structure
Combustion and fire research
Alternate and petroleum-derived fuels
Simulation/modeling
Synchrotron radiation beam lines (at NSLS,
Brookhaven, NY)
Raman Spectroscopic Laboratory

Electronics Science and Technology Division (Code 6800)

Nano- and micro-electronics characterization and processing facilities

Electron-beam nanowriter

High-resolution transmission electron microscope

Scanning tunneling microscopy and electrooptical analysis

Crystal-growing facilities including bulk growth, molecular beam expitaxy, and organo-metallic chemical vapor deposition

Optical and electrical characterization of materials

Electronic testing and analysis facilities Vacuum electronics engineering facility

Information Technology Division (Code 5500)

HF modem and channel simulation
Brandywine antenna range
Pomonkey test range
CBD Ship Motion Simulator
Signal analysis laboratory
Artificial intelligence computer network
HCI laboratory
Certification and INFOSEC engineering labora-

Virtual reality laboratory

DoD High Performance Computing Modernization Program (HPCMP) Distributed Center (DC)

High-speed ATM network (backbone and to the desktop)

ATD net Washington area pop for high performance, multi-gigabit optical streams

Distributed file systems with authentication (Andrew File System/Multi-Resident Andrew File System (AFS/MRAFS))

Lab-wide network, NICEnet, providing computer communications, video services, and gateways to networks and computer systems worldwide

Satellite dishes for video and data reception File server/archiver system for central file storage of lab-wide data Visualization laboratory
Lab-wide ADP training facility
Navy engagement warfare assessment and
virtual engineering (newave) research center
NATO Improved Link-Eleven (NILE) Test Bed

Laboratory for Computational Physics and Fluid Dynamics (Code 6400)

Six-processor SGI Power Onyx workstation
Eighteen-processor SGI Power Challenge
Twenty-four processor SGI Origin 2000
Thirty-two processor SGI Origin 2000
Sixty-four processor HP Exemplar
Sixteen-processor HP Exemplar
D2 Digital video and animation laboratory
SUN Microsystems 670MP workstation server
Over sixty SUN, SGI, and MACINTOSH workstations

Three-fourths terabyte RAID Disk Storage Systems

All computers and workstations have network connections to NICENET and ATDNET allowing access to the NRL CCS facilities (including the DoD HPC resources) and many other computer resources both internal and external to NRL.

Laboratory for Structure of Matter (Code 6030)

Two area detector systems
Two X-ray diffractometers
Zymark robotics
Four silicon graphics IRIS workstations
Protein and peptide chromatography
Atomic force microscope

Marine Geosciences Division (Code 7400)

Airborne gravimetry, magnetics, and topographic measurements suite coupled with differential GPS yielding position accuracies of <1.0 meter

Deep-towed acoustic geophysical system operating at 250-650 Hz characterizes subseafloor structure including gas clathrate accumulations and dissociation of methane hydrates

Acoustic seafloor classification system operating at 15-50 kHz provides underway, real-time prediction of sediment type and consistency

Seafloor probes for measuring sediment pore water pressures and acoustic compressional and shear wave velocities and attenuations

100 and 300 kV transmission electron microscopes with environmental cell for study of

sediment fabric, especially impact of organics Object-oriented digital cartographic modeling techniques and databases with Internet access

Map data formatting facility compresses map information onto compact disk-read only memory media for masters for use in aircraft digital moving map systems

ORCA and RMSO radio controlled semi-submersible mapping systems

Magnetic observatory conducts measurements of ambient field and other magnetic phenomena

Comprehensive geotechnical and geoacoustics laboratory capability

Airborne ElectroMagnetic (AEM) bathymetry system

Ocean bottom magnetometer system

3-D, multi-spectral, subbottom swath imaging system

Ocean Bottom Seismographs (OBS)

In-Situ Sediment Acoustic Measurement System (ISSAMS)

Hydrothermal plume imaging data acquisition and analysis system

Integrated digital databases analysis and display system for bathymetric, meteorological, oceanographic, geoacoustic, and acoustic data

Stereometric video image processing system for use in foreshore morphology measurement Sediment gas-content sampler

Acoustic tomographic probes for surf zone sands Surf zone sediment penetrometer

Marine Meteorology Division (Code 7500)

Tactical Environmental Support System (TESS) for fielding regional and shipboard METOC applications

SMQ-11 shipboard antenna system for retrieving polar-orbiting satellite data

Geostationary satellite data direct readout and processing center

Super-workstations for numerical weather prediction systems development

Master Environmental Library (MEL) implemented on super-workstations for archiving and distributing real-time and historical atmosphere/ocean data bases

Bergen Data Center for extensive file serving and research data backup/archival capability

Data visualization center for developing shipboard briefing tools, displaying observations and model output, and integrating meteorological parameters into tactical simulations

Materials Science and Technology Division (Code 6300)

Ultrasonic gas atomizer Hot isostatic press Cold isostatic press

High-energy, dispersive X-ray analytical system Electron microprobe, SEM, SAM, and STEM systems

Quantitative metallography

Computer-controlled multiaxial loading and SCC measurement systems

Computer-interactive, nonlinear, multimode fracture measurement system

Computer-aided, experimental stress analysis Crystallite Orientation Distribution Function (CODF)

Thermoelectric parametric measurement system Class 1000 clean room; processing metallic film Elevated temperature and structural characterization laboratory

Nondestructive evaluation laboratory

Closed-loop, low- and high-cycle fatigue systems

Metallic film deposition systems

Magnetometry

Mossbauer spectroscopy

Cryogenic facilities

High-field magnets

High-resolution analytical electron microscope

Isothermal heat treating facility

Vacuum arc melting facility

Vacuum induction melting facility

3-MeV tandem Van de Graaff accelerator

200-keV ion-implantation facility

Microwave test facility

Excimer laser film deposition facility

Bomen infrared spectrometer facility

Diffuse light scattering facility

Femtosecond laser facility

Semiconductor assessment facility

Surface characterization facility

Oceanography Division (Code 7300)

Towed sensor and advanced microstructure profiler systems for studying upper ocean fine and micro-structure

Integrated absorption cavity and optical profiler systems for studying ocean optical characteristics

Environmental scanning electron microscope and confocal laser scanning microscope for detailed studies of bio-corrosion in naval materials

Self-contained bottom mounted upwardlooking acoustic profilers for measuring ocean variability Acoustic doppler profiler for determining ocean

currents while under way
Remotely operated underwater vehicle (ROV)
Bottom mounted acoustic doppler profilers
Towed hyperspectra optical array
SCI Processing Facility
Satellite Receiving Stations for AVHRR, SeaWifs,
DMSP Ocean Color Processing Facility

Optical Sciences Division (Code 5600)

Electron-beam, electron-beam sustained, X-ray, and UV preionized laser devices with spectroscopic and other diagnostic equipment

Short-pulse excitation apparatus for kinetic

Short-pulse excitation apparatus for kinetic mechanisms investigations

IR laser facility for optical characterization of semiconductors

Mobile, high-precision optical tracker
Facilities for synthesis and characterization of
optical glass compositions and for the fabrication of optical fibers

Optical and digital image processing facilities Silica and IR fluoride/chalcogenide fiber fabrication facilities

Facilities for fabricating and testing integrated optical devices

Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems

Computer IR/EO technology/systems simulation center

High-energy pulsed chemical laser laboratory Laser diode pumped 10 W 2 μm solid state lasers

Field-qualified EO/IR measurements devices Focal plane array evaluation facility Mid-IR, low phonon crystal growth facility Onyx-based multispectral image processing facility

Indoor IR test range NRL P-3 aircraft sensor pallet EO/IR high-resolution sensors IRCM

Common data link

Infrared countermeasure techniques laboratory Multi and hyperspectral sensors and processing Response of fiber-optic hydrophone as a function of temperature and pressure

Environmental testing of fiber sensors (acoustic, magnetic, electric field, etc.)

High-speed, high-power photodetector characterization

Communication link characterization to >100 Gbps

RF phase noise, noise figure, and network analysis

Plasma Physics Division (Code 6700)

PAWN, 1-MJ compact inductive storage facility Gamble II high-voltage pulsed power generators HAWK, 1 MA inductive storage facility PHAROS III, three-beam neodymium-glass laser and target facility

Table-Top Terawatt (T³) laser system NIKE krypton fluoride laser facility High-power relativistic klystron and gyrotron facilities

Large volume space chamber (2 m × 5 m) Large area plasma processing system Microwave facility for processing of advanced materials (2.45, 35, 94, and 60-120 GHz)

Radar Division (Code 5300)

Airborne research radar facility, including advanced profile high-resolution imaging radar and P3 (1998) with APS-145 Group 2t and CEC

Ship radar-cross-section computer prediction facility

Electromagnetic numerical computation facility Shipboard radar research and development test beds:

- 1. Senrad wideband air surveillance radar facility
- 2. Volume surveillance radar test bed
- 3. Ship self-defense surveillance and engagement demonstration systems

Cooperative aircraft identification (IFF) ground station facility

Shipboard radar display facility

Compact range antenna measurement laboratory

Experimental mode-stirred chamber for electromagnetic compatibility qualification
CBD fleet radar systems facility
Space-time adaptive processing laboratory
Electronic computer-aided design facility
Clutter research radar

Remote Sensing Division (Code 7200)

Polar ozone and aerosol monitor space sensor Ground-based stratospheric water-vapor monitoring system

SAR processing facility SCI processing facility SEALAB NASE LAB

Hyperspectral imaging, sensors, and processing Optical remote sensing calibration lab/facility Navy prototype optical interferometer NRL/NRAD 74 MHz very large array Free surface hydrodynamics laboratory SSM/I processing facility

STEMS system

Ocean tower/platform/ship radar

Volume Imaging Lidar system

Aerosol and field measurement facility

Airborne Polarimetric Microwave Imaging

Radiometer (APMIR)

NRL RP-3A aircraft sensors

Airborne Lidar

MMW imagers

DMSP SSM/I simulator

PRT-5 IR radiometer

Imaging real-aperture radar (RAR)

Flight-level meteorological sensors

Hyperspectral sensor systems (PHILLS)

Ultra wideband SAR (NUSAR)

Research and Development Services Division (Code 3500)

Military construction

ONR facilities support

Research support engineering

Planning

Full range of facility contracting, including construction, architect/engineering services, facilities support, and base operating services

Transportation

Telephone services

Maintenance and repair of buildings, grounds, and communication and alarm systems

Shops for machining, sheet metal, welding, and plating

Spacecraft Engineering Department (Code 8200)

Chambers:

Thermal-vacuum

Acoustic reverberation

Facilities:

Shock and vibration test

Clean-rooms

Spacecraft-fabrication and assembly

Fuels test

Autoclave

Rotary air bearing

CAD/CAM

Automatic welding

Static loads test

Spacecraft spin balance

Modal analysis

Space Science Division (Code 7600)

E.O. Hulburt Center for Space Research Development and test facilities for spaceborne instruments to perform astrophysical, solar, high-atmospheric, and space-environment sensing

Clean-room facilities

Extensive computer-assisted data manipulation and interpretive capability for space-data imaging and modeling

Backgrounds Center of Expertise (BCoE)

Ballistic Missile Defense Organization (BMDO)

Synthetic Scene Generation Model (SSGM)

Backgrounds Data Center for analysis of BMDOrelevant natural backgrounds

Special Sensor Ultraviolet Limb Imager (SSULI) calibration facility

Ultraviolet remote sensing data center

Low-temperature laboratory

Gamma Ray Observatory (OSSE) operations and data analysis center

Solar instrument test facility

Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) operations and data analysis center

Large Angle Spectrometric Coronagraph (LASCO) operation and data analysis

Extreme-ultraviolet Imaging Telescope (EIT)

Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI) to measure OH and NO in middle atmosphere

Space Systems Development Department (Code 8100)

Payload test facility and processor development laboratory

Spacecraft high-reliability electronic and electrical production facility

Spacecraft electronic systems integration and test facility

Spacecraft electrical power systems and battery laboratories

Laser physics and electro-optics laboratories Tactical Technology Development Laboratory (TTDL)

Electromagnetic interference/electromagnetic computability (EMI/EMC) screen room test facility

Precision oscillator (clock) test facility

Radio frequency (RF) system development facility

RF microcircuit fabrication cleanroom facility Large tapered horn RF anechoic chamber facility RF payload development laboratory with anechoic chamber

Precision high-frequency RF compact range anechoic chamber facility

Transportable ground station development, assembly, and test facility

Satellite telemetry, tracking and control facilities Pomonkey Field Site/large antenna, space communications, and research facility Midway Research Center/space communications and research facility

Tactical Electronic Warfare Division (Code 5700)

Mobile infrared signature measurement and simulation facility

Mobile ESM laboratory

Hybrid RF/IR missile-seeker simulation facility Central target simulation facility for developing, testing, and evaluating EW systems and techniques, using real-time, hardware-in-theloop models

RF simulation laboratory and signal simulators Radar cross-section measurement facility (at CBD)

Search radar ECM simulator
Advanced tactical EW environment simulator
Electronic warfare coordination test bed
Scale-model analysis facility
Wind tunnel for performance measurements of
low Reynolds number vehicles
Optical integration laboratory
Tempest signal-processing laboratory
Simulated ship-mast facility
Secure supercomputer facility
Vehicle development laboratory
Visualization laboratory

Technical Information Division (Code 5200)

History Office NARDIC (Naval Acquisition, Research, and Development Information Center) Ruth H. Hooker Research and Technical Information Center:

On-line catalog of unclassified publications LAN-based catalog of classified and unclassified publications Web-access to journals, reports, press releases, NRL publications Digital library projects with association, commercial, and government publishers Consortial relationship with NIST, NASA Goddard Space Flight Center, NSA Writing, editing, and publication services Graphic design and printing services **Imaging Center** Photographic laboratory NRL Exhibit Program: display, design, production Multimedia design and production Video editing suite Scientific and technical photography Auditorium services Mail handling services Correspondence review and archives services Forms Supply Store Electronic forms and forms design



NRL Sites and Facilities

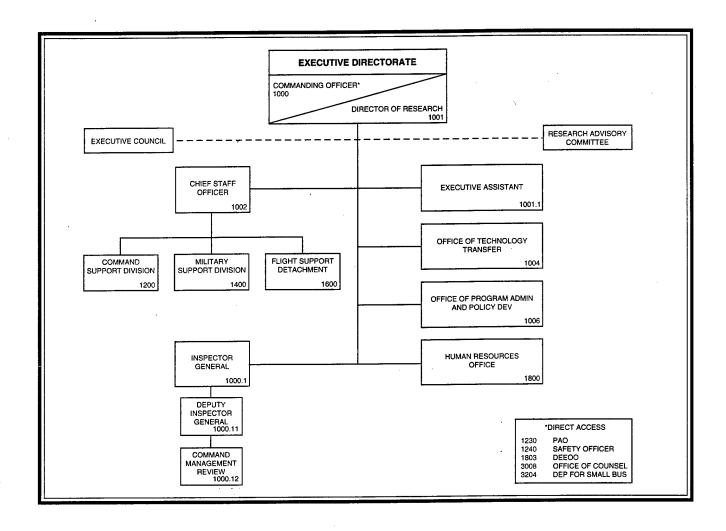
	ACREAGE		BUW DIVICE!	
SITE	LAND OWNED/LEASED	EASEMENT/ LICENSE- PERMIT	BUILDINGS/ STRUCTURES	
District of Columbia				
NRL and Artificial Intelligence				
Center at Bolling AFB	131/0	0/10.24	107/25	
Virginia		3, 20,21	10,7,20	
Midway Research Center				
Quantico	162/0		9/1	
Maryland	· ·		7/1	
NRL Flight Support				
Detachment, NAS				
Patuxent River*	Tenant			
Chesapeake Bay Section				
and Dock Facility				
Chesapeake Beach*	157/0	0/0.60	62/87	
Multiple Research Site		·	, 🕶	
Tilghman Island*	2/0		3/3	
Radio Astronomy Observatory			- , -	
Maryland Point*	24/0		10/16	
Radio Antenna Range			,	
USAF Receiver Site				
Brandywine*	0/0	0/22.98	1/0	
Free Space Antenna Range			·	
Pomonkey*	56/0	28.40/0	9/11	
Florida			·	
Marine Corrosion Facility				
Key West	Tenant			
California				
NRL Monterey				
Monterey*	Tenant			
Mississippi				
Stennis Space Center				
Bay St. Louis*	Tenant			
Alabama				
Ex-USS Shadwell (LSD-15)	Tenant	l		
Mobile Bay	Decommissioned	457-ft vessel used	d for fire research	

PR	OF	'ER	TY

Land: Owned Leased	556 acres 0 acres	Buildings: RDT&E Administrative	3,167,125 ft² 225,812 ft²	Replacement Costs: Real property – currer Replacement value	
		Other	422,367 ft ²	Equipment	\$186.7 million

^{*}See maps in the General Information section (page 137).

Executive Directorate



Key Personnel

Name	Title	Code
CAPT B.W. Buckley, USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
Mr. D.J. DeÝoung	Executive Assistant	1001.1
CAPT G.G. Brown, USN	Chief Staff Officer/Inspector General	1002/1000.1
Mr. J.C. Payne	Head, Command Support Division/Deputy Inspector General	1200/1000.11
Ms. B. Peters	Command Management Review	1000.12
Dr. C.M. Cotell	Head, Office of Technology Transfer	1004
Mrs. L.T. McDonald	Head, Office of Program Administration and	
	Policy Development	1006
Mr. R.L. Thompson*	Head, Public Affairs Branch	1230
Vacant	Head, Safety Branch	124 0
CDR A. Leigh, USN	Head, Military Support Division	1400
CDR T. McMurry, USN	Officer in Charge, Flight Support Detachment	1600
Ms. B.A. Duffield*	Director, Human Resources Office	1800
Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Mr. J. McCutcheon	Head, Office of Counsel	3008
Ms. L. Byrne	Deputy for Small Business	3204
*Acting		

EXECUTIVE DIRECTORATE

Code 1000 and Code 1001

The Commanding Officer (Code 1000) and the Director of Research (Code 1001) share executive responsibility for the management of the Naval Research Laboratory. In accordance with Navy requirements, the Commanding Officer is responsible for the overall management of the Laboratory and exercises the usual functions of command including compliance with legal and regulatory requirements, liaison with other military activities, as well as the general supervision of the quality, timeliness, and effectiveness of the technical work and of the support services.

The Commanding Officer delegates line authority and assigns responsibility to the Director of Research for the technical program, its planning, conduct, and staffing; evaluation of the technical competence of personnel; liaison with the scientific community; selection of subordinate technical personnel; exchange of technical information; and the effective execution of the NRL mission.

Within the limits of Navy regulations, the Commanding Officer and the Director of Research share authority and responsibility for the internal management of the Laboratory. The Commanding Officer retains all authority and responsibility specifically assigned to him by higher authority.

The mission of the Laboratory is carried out by three science and technology directorates and the Naval Center for Space Technology, supported by the Business Operations Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and to the Director of Research. The operating staffs are listed on the following pages of this publication.

Commanding Officer



APT Bruce W. Buckley, USN, graduated from the United States Naval Academy in 1973. CAPT Buckley entered flight training and was designated a Naval Aviator in December 1974 at Naval Air Station Chase Field, Texas. After completing replacement pilot training in the F-14A at Fighter Squadron 124, he was assigned as an F-14A pilot in Fighter Squadron 24.

CAPT Buckley has accumulated extensive experience in research, development, engineering, and project management beginning with a tour on the Joint Test Force of the Air Combat/Air-to-Air Missile Evaluation at Nellis Air Force

Base, Nevada. He then attended the Naval Postgraduate School at Monterey, California, where he earned a Master of Science in Electrical Engineering with Distinction. While at postgraduate school, CAPT Buckley was selected to be designated an Aerospace Engineering Duty Officer (AEDO).

As an AEDO, CAPT Buckley has had positions of increasing responsibility in engineering and program management including F/A-18 F404 Project Officer at the Naval Plant Representatives Office, Lynn, Massachusetts; Avionics and Electro-Optics Projects Manager in the F/A-18 Program Management Office, Assistant to the Program Director of Tactical Aircraft Programs, F404 Engine Program Manager, and Program and Policy Branch Head in the Propulsion Division, all at the Naval Air Systems Command, Arlington, Virginia. CAPT Buckley then served in two positions, as the F-14 Aircrew Systems Program Manager and as the Deputy Director of the Research and Engineering Department of the Naval Training Systems Center in Orlando, Florida. Returning to Washington and the Naval Air Systems Command in July 1993, he served as the Director of the Propulsion and Power Division and the Executive Assistant to the Commander, Naval Air Systems Command. CAPT Buckley assumed command of the Naval Research Laboratory on January 26, 1996.

CAPT Buckley's decorations include the Legion of Merit, the Meritorious Service Medal, a Joint Service Commendation, and three Navy Commendations.

CAPT Buckley is married to the former Janice E. Faller of Miami, Florida, and they have two daughters, Michele and Sandra.

NRL's New Commanding Officer August 6, 1999

Captain Douglas H. Rau, USN Commanding Officer Naval Research Laboratory

Captain Douglas H. Rau, born and raised in Mountainside, New Jersey, graduated from the United States Naval Academy in 1974. He participated in the Immediate Graduate Education Program at the University of Washington and then reported to Surface Warfare Officer School and qualified as a Surface Warfare Officer onboard the USS Fox (CG-33).

CAPT Rau continued his career serving in engineering, research, development, and project management related billets. In 1986, he transferred to the Engineering Duty Officer community.

Sea service assignments include:

USS Fox (CG-33) USS Rathburne (FF-1057) COMDESRON 35

USS Nimitz (CVN-68)

Main Propulsion Assistant Chief Engineer Squadron Engineer Chief Engineer

Shore duty assignments include:

Pearl Harbor Naval Shipyard

PERA(CV)

Puget Sound Naval Shipyard CNO's Strategic Studies Group

Bureau of Personnel

Naval Sea Systems Command

Project superintendent for DD963 overhauls

Officer in Charge

Engineering and Planning Department Head

Fellow

Engineering Duty Officer Community Manager

Executive Assistant

Education:

USNA U of Washington

Naval Postgraduate School

U of Pittsburgh

BS Ocean Engineering, graduate with distinction

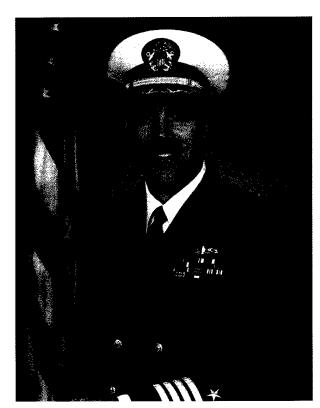
Studies in Naval Architecture

MS Mechanical Engineering, graduate with distinction

Management Program for Executives

CAPT Rau's decorations include the Legion of Merit, Meritorious Service Medal with one star, Navy Commendation Medal with one star, Navy Achievement Medal, and various unit citations and campaign ribbons.

CAPT Rau is married to the former Colette Greceldhes of Port Orchard, Washington. They have three daughters, Asia, Amber, and Alisa.



Director of Research

Dr. Timothy Coffey was born in Washington, DC, on June 27, 1941. He graduated from the Massachusetts Institute of Technology in 1962 with a B.S. degree in electrical engineering, and obtained his M.S. (1963) and Ph.D. (1967), both in physics, from the University of Michigan.

During his graduate career, Dr. Coffey worked as a research assistant at the University of California (1963-64), a research physicist at the Air Force Cambridge Research Laboratories (1964-65), and a teaching fellow and research assistant in physics at the University of Michigan (1965-66). As a scientific consultant for EG&G,



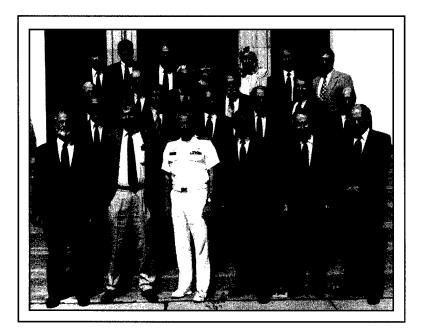
Inc. (1966-71), he was involved in investigations in theoretical and mathematical physics.

Dr. Coffey came to the Naval Research Laboratory in 1971 as Head of the Plasma Dynamics Branch, Plasma Physics Division. In this position, he directed research in the simulation of plasma instabilities, the development of multidimensional fluid and magnetohydrodynamic codes, and the development of computer codes for treating chemically reactive flows. In 1975, he was named Superintendent, Plasma Physics Division; he was appointed Associate Director of Research for General Science and Technology on January 1, 1980. On November 28, 1982, he was named Director of Research.

Dr. Coffey is recognized as an authority on the theory of nonlinear oscillations and has played a major role in the national program on high-altitude nuclear effects. The author or co-author of over 70 publications and reports, he has made several fundamental contributions to the theory of electron beam/plasma interaction and to the understanding of plasma processes in the Earth's ionosphere.

Dr. Coffey is a fellow of the American Physical Society and of the Washington Academy of Sciences. He has been presented the following awards: Presidential Rank of Meritorious Executive, in 1981; Distinguished Presidential Rank, in 1987; Delmer S. Fahrney Medal, Franklin Institute, in 1991; DoD Distinguished Civilian Service, in 1991; Distinguished Presidential Rank, in 1994; and Senior Executives Association Professional Development League's 1995 Executives Excellence Award.

Executive Council



The Executive Council consists of executive, management, and administrative personnel. Executive Council members include:

Commanding Officer, Chairperson

Director of Research

Associate Directors of Research

Chief Staff Officer

Director, Naval Center for Space Technology

Heads of Divisions

Head, Laboratory for Structure of Matter

Head, Laboratory for Computational Physics and Fluid Dynamics

Head, Center for Bio/Molecular Science and Engineering

Director, Human Resources Office

Public Affairs Officer

Deputy Equal Employment Opportunity Officer

Head, Office of Program Administration and Policy Development

Safety Officer

Head, Office of Counsel

Research Advisory Committee



The Research Advisory Committee advises the Commanding Officer and the Director of Research on scientific programs and the administration of the Laboratory. The committee assists in planning the long-range scientific program, coordinating the scientific work, reviewing the budget, accepting or modifying problems, considering personnel actions, and initiating such studies as may be necessary or desirable. The membership consists of:

Director of Research, Chairperson Commanding Officer Associate Directors of Research Chief Staff Officer (Observer)



CAPT G.G. Brown, USN

Chief Staff Officer/Inspector General Code 1002/1000.1

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Command Support Division (Code 1200), the Military Support Division (Code 1400), and the Flight Support Detachment (NAS Patuxent River, MD, Code 1600) report directly to the Chief Staff Officer. When directed, the Laboratory's Inspector General investigates, inspects, and/or inquires into matters that affect the operation and efficiency of NRL. These matters include but are not limited to: effectiveness, efficiency, and economy; management practices; and fraud and waste. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.



Mr. R.L. THOMPSON*

Public Affairs Officer Code 1230

The Public Affairs Officer (PAO) advises the Commanding Officer and Director of Research on public affairs matters, including external and internal relations, community outreach, and serves as the Commanding Officer's principal assistant in the area of public affairs. To do this, the PAO plans and directs a program of public information dissemination on official NRL activities. The PAO coordinates responses to requests from the news media and the public for unclassified information or materials dealing with the Laboratory, coordinates participation in community relations activities, and directs the NRL history and internal information programs. The PAO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA).



MR. S. BURNS

Safety Officer Code 1240

The Head of the Safety Branch acts as the Safety Officer and is the program manager for Occupational Safety and Health, Explosives Safety, Industrial Hygiene, Hazardous Material Control and Management, Radiological Safety, Non-Ionizing Radiation Safety, and Environmental Protection. The Safety Branch must ensure that the development, implementation, and maintenance of comprehensive safety and environmental compliance programs, in support of the Laboratory's unique areas of research and development, comply with the appropriate federal, state, Navy, and NRL regulations.

^{*}Acting



Ms. D.E. ERWIN

Deputy Equal Employment Opportunity Officer Code 1803

The Deputy Equal Employment Opportunity Officer (DEEOO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEOO manages the discrimination complaint process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, African American Employment, Asian-Pacific Islanders, American Indian Employment, Individuals with Disabilities, including Disabled Veterans). The DEEOO recruits quality candidates for those areas when underrepresentation exists. Duties also include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs.



Mr. I. McCutcheon

Office of Counsel Code 3008

The Office of Counsel is primarily responsible for providing legal services to NRL's management in all areas of general and administrative law, and intellectual property law. The Office reviews all procurement-related actions; reviews NRL scientific papers prior to publication; prepares patent applications and prosecutes the applications through the Patent and Trademark Office; defends against contract protests, other contract litigation, and personnel cases; and advises on other legal matters relating to technology transfer, personnel, fiscal, and environmental law. NRL Counsel also serves as legal advisor to the Commanding Officer and Director of Research.

Office of Program Administration and Policy Development

Code 1006



Mrs. L.T. McDonald

Basic Responsibilities

The Office of Program Administration and Policy Development provides managerial, technical, and administrative support to the Director of Research (DOR) in such areas as program and policy development, intra-Navy and inter-Service Science and Technology (S&T) program coordination, liaison with other Navy, DoD and government activities on matters of mutual concern, and support to the Executive Directorate in planning and directing NRL's S&T (6.1, 6.2) program. Specific functions include: monitors and provides background information on technical and policy matters that come under the purview of the DOR; represents NRL, ONR, and/or the Navy on tri-Service or DoD-wide coordination matters; performs special studies or chairs ad hoc study groups regarding program decisions or policy positions; performs special studies involving major NRL programs and resource issues; provides administrative support in the areas of personnel, budget, facilities, equipment, and security; provides executive management information and analyses for various aspects of the S&T program effort; coordinates VIP visits to NRL; manages the NRL directives system; administers the NRL response to Congressional requests; maintains the NRL R&D achievements file; develops the S&T guidance for monitoring and reporting the NRL S&T program; responsible for the administration of NRL's various postdoctoral fellowship programs; and manages the Facility Modernization Program.

Personnel: 19 full-time civilian

Key Personnel

Name	Title	Code
Mrs. L.T. McDonald	Head	1006
Ms. L.S. Herrin	Head, Program Administration Staff	1006.1
Ms. L. Renfro	Head, GLSIP Program	1006.17
Ms. B. Murphy	Administrative Officer	1006.2
Vacant	Head, Management Information Staff	1006.3
Mr. E. Rank	Head, NRL Facilities Staff	1006.4
Ms. M.E. Barton	Head, Directives Staff	1006.5

Point of contact: Ms. B. Murphy, Code 1006.2, (202) 767-3082

Command Support Division

Code 1200 Staff Activity Areas

- SecurityPublic Affairs
- Safety
- Fire Protection

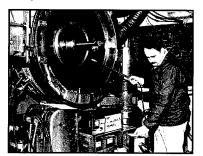
Public affairs





Security monitoring

Safety evaluation

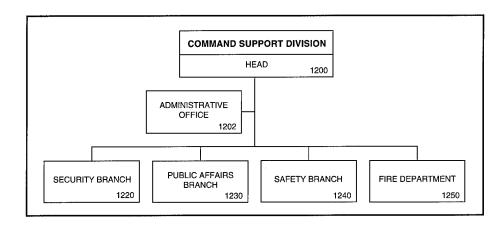




Incoming visitor's reception area



Mr. J.C. Payne



Basic Responsibilities

The Command Support Division provides civilian staff to the Commanding Officer and to the Director of Research. The Division is responsible for the Laboratory's physical, personnel, information, industrial and ADP security programs, communications service, fire protection, occupational safety, health and industrial hygiene, and environmental and public affairs. It provides intelligence support and support for international cooperative agreements in technology. The Division also coordinates the Laboratory's Management Control Program and provides liaison and coordination for all audit and inspection teams. In addition, administrative/budget supervision over the Military Operations Branch and the Patuxent River Flight Support Detachment is provided.

The Head of the Command Support Division is also the Deputy Inspector General. The Deputy Inspector General is responsible for day-to-day functioning of the office and its staff, program planning and execution and provides interface with outside agencies concerning inspections and audits conducted or to be conducted by NRL. These include Inspector General representatives from ONR, Navy, DoD, and GAO.

Personnel: 146 full-time civilian

Key Personnel

Name	Title	Code
Mr. J.C. Payne	Head	1200
Ms. M.A. Sepety	Administrative Officer	1202
Mr. J.T. Miller	Head, Security Branch	1220
Mr. R. Perry	Head, Information and Personnel Security Services Section	1221
Mr. C. Rogers	Head, Classification Management and Control	
-	Services Unit	1221.1
Ms. K. Coleman	Head, Personnel Security Services Unit	1221.2
Chief W.C. Edwards	Head, Guard Force	1222.2
Vacant	Head, Security Administration Services Unit	1222.3
Mr. J.T. Miller	Head, Special Security Section	1223
Ms. J. Gray	Head, SSO Services Unit	1223.1
Ms. J. Gray*	Head, Special Programs Security Services Unit	1223.2
Mr. R.L. Thompson*	Head, Public Affairs Branch	1230
Mr. S. Burns	Head, Safety Branch	1240
Mr. E. Stillwell	Fire Chief	1250

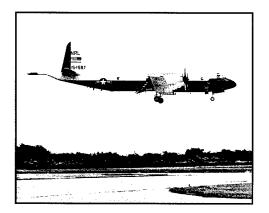
Point of contact: Ms. M.A. Sepety, Code 1202, (202) 767-3204

^{*}Acting

Military Support Division

Code 1400 Staff Activity Areas

- Operations Administrative Operations



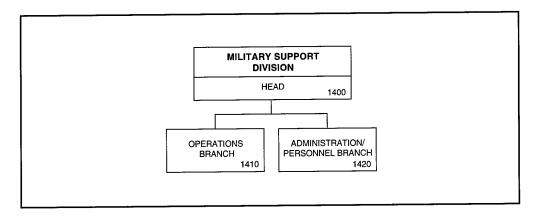
P-3 airborne research facility



Administration



CDR A.M. Leigh, USN



Basic Responsibilities

The Military Support Division provides military operational, and administrative services to NRL. The Operations Branch assists NRL Research Directorates in planning and executing project flight missions; develops deployment schedules and military operational and training objectives; and coordinates the Research Reserve Program within NRL.

The Military Administration Branch is responsible for the coordination and efficient functioning of all military administrative operations for NRL (including site detachments). These duties specifically include: personnel actions, maintenance of personnel records, performance evaluations, awards and training; advising the Chief Staff Officer on manpower matters and organization issues; and preparation and administration of the military operational budget.

Personnel: 1 full-time civilian; 10 military

Key Personnel

Name	Title	Code
CDR A.M. Leigh, USN	Head	1400
LT D.J. Popplewell, USN	Assistant Military Operations Officer	1410
CDR R.L. Miller, USN	Military Administration and Personnel	1420

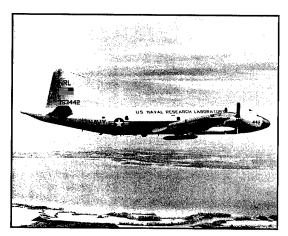
Point of contact: YNC C. Coverson, USN, Code 1420, (202) 767-6058

Flight Support Detachment

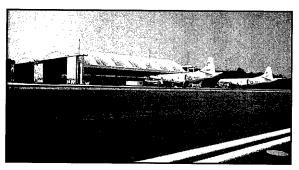
Code 1600 Staff Activity Areas

- Operations Administrative Operations Aircraft Maintenance
- Safety/NATOPS





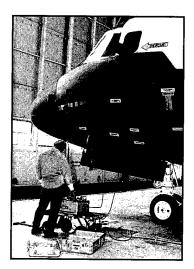
P-3 airborne research facility



Flight Support Detachment hangar



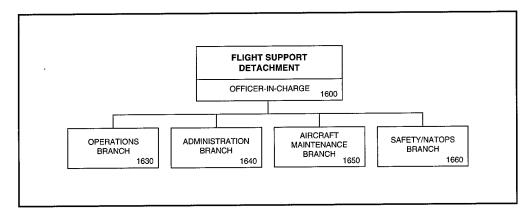
Administration



Aircraft maintenance



CDR T.A. McMurry, USN



Basic Responsibilities

The Flight Support Detachment located at NAS Patuxent River, Maryland, operates and maintains five uniquely configured P-3 Orion aircraft. The men and women of the detachment provide the Naval Research Laboratory with airborne research platforms, conducting flights worldwide in support of a wide spectrum of projects and experiments. These include: magnetic variation mapping, hydroacoustic research, bathymetry, electronic countermeasures, gravity mapping, and radar research. The detachment annually logs 2,000 flight hours and in its 34 years the Flight Support Detachment has amassed 55,000 hours of accident-free flying.

Personnel: 5 full-time civilian; 95 military

Key Personnel

Name	Title	Code
CDR T.A. McMurry, USN LCDR V.R. Estornell, USN AFCM T.E. O'Connor, USN Mrs. B.J. Walter LT E.H. Parry, USN LT J.L. Virant, USNR LCDR D.L. Erlewine, USN ADC W.D. Nance, USN	Officer-in-Charge Assistant Officer in Charge Command Master Chief Executive Secretary Operations Officer Administrative Officer Aircraft Maintenance Officer Maintenance/Material Control Officer	1600 1600.1 1600.2 1600.4 1630 1640 1650
LT J.M. Baillio, USN	Head, Safety/NATOPS Branch	1660

Point of contact: Mrs. B.J. Walter, Code 1640, (301) 342-4926; DSN 342-4926

Human Resources Office

Code 1800 Staff Activity Areas

- Staffing and Classification
- Employee Development
- Employee Relations
- Equal Employment Opportunity
- Management and Systems Technology



Employee Relations Branch



Information Technology Section



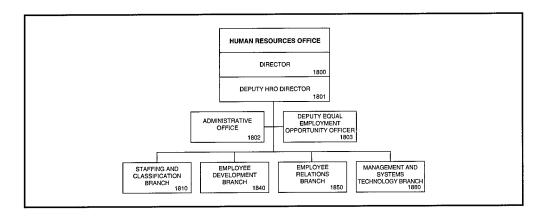
EEO Staff



Workforce Support and Manpower Programs



Staffing and Classification Branch



The Human Resources Office (HRO) provides civilian personnel and Equal Employment Opportunity (EEO) services to the Naval Research Laboratory (NRL). The Human Resources Program provides the full range of operating civilian personnel management in the staffing and placement, position classification, employee relations, labor relations, employee development, EEO functional areas, Manpower Management, and Morale, Welfare, and Recreation Programs.

The HRO at NRL-Main Site in Washington, DC services approximately 3,000 employees as well as provides a centralized capability to perform various managerial, service, and advisory functions in support of field office operations. These include such items as issuance of policy and procedural directives; development, design, and maintenance of automated systems; and monitoring and evaluating product effectiveness to develop and maintain efficient, cost-effective, service-oriented methods.

Personnel: 42 full-time civilian

Key Personnel

Name	Title	Code
Ms. B.A. Duffield*	Director	1800
Mr. D. Schenk	Deputy Director Administrative Officer	1801 1802
Ms. P.L. Hetzler Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Ms. C. Downing	Head, Staffing and Classification Branch	1810
Mr. F.W. Robbins	Head, Employee Development Branch	1840
Ms. J.L. Walker	Head, Employee Relations Branch	1850
Ms. J.M. Sykes	Head, Management and Systems Technology Branch	1880

Point of contact: Ms. P. Hetzler, Code 1802, (202) 767-3035

^{*}Acting

Business Operations Directorate

BUSINESS OPERATIONS DIRECTORATE

Code 3000

The Business Operations Directorate provides executive management, policy development, and program administration for business programs needed to support the activities of the scientific directorates. This support is in the areas of legal counsel, manpower management, financial management, supply management, contracting, public works, and management information systems support.

Associate Director of Research for Business Operations



Mr. D.K. Therning*was born in Modesto, California, on August 29, 1960. He graduated from Washington State University with a bachelor's degree in finance in 1983 and earned a master's degree in business administration from George Mason University in 1993.

Mr. Therning has accumulated extensive experience in the financial business management of research, development, test, and evaluation (RDT&E) activities within the Department of Navy (DoN) beginning at the Naval Weapons Center, China Lake, California, where he served as a budget analyst in the Public Works Department and then in the Weapons Depart-

ment. In 1984, he became the Financial Management Advisor to the Ordnance Systems Department. In 1985, under the auspices of the Naval Scientist Training and Exchange Program, he was selected for a one-year assignment in the Office of the Director of Naval Laboratories (DNL), Washington, D.C. He remained on the DNL staff as a budget analyst until 1987, when he was appointed Budget Officer of the DNL's seven Navy Industrial Fund R&D laboratories.

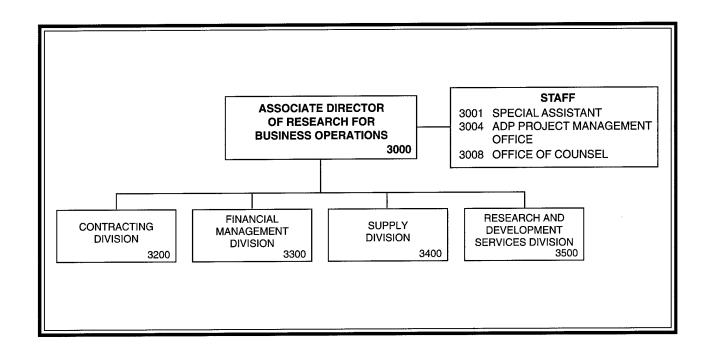
As the DoN reorganized the R&D laboratories and T&E activities, Mr. Therning oversaw the financial reorganization of the DNL labs with other activities into the Naval warfare centers. Upon the disestablishment of DNL, Mr. Therning remained in the Space and Naval Warfare Systems Command as the Director of the Defense Business Operations Fund (DZBOF) Resources Management Division, with collateral duty as the Financial Manager of the Naval Command, Control, and Ocean Surveillance Center (NCCOSC). During this time, he managed the conversion of nine appropriated fund engineering activities to DBOF and the financial consolidation of these activities with NCCOSC.

In 1995, Mr. Therning served as Head of the Revolving Funds Branch of the Office of the Assistant Secretary of the Navy (Financial Management and Controller), where he was responsible for the budget formulation and execution processes of all DoN DBOF activities, which includes the RDT&E activities, shipyards, aviation depots, ordnance centers, and supply centers.

Mr. Therning was appointed Head, Financial Management Divison/Comptroller of NRL in July 1996. Since that time, his responsibilities have increased in the Business Operations Directorate. In October 1996, in addition to leading the Financial Management Division, he assumed responsibilities for the Management Information Systems office. In January 1999, as an additional duty to his role as Comptroller, Mr. Therning was appointed to the newly established position of Deputy Associate Director of Research for Business Operations to assist in the management and administration of the Business Operations Directorate.

Mr. Therning has been the Acting Associate Director of Research for Business Operations since April 1999.

^{*}Acting



Key Personnel

Name	Title	Code
Mr. D.K. Therning*	Associate Director of Research for Business Operations	3000
Mr. D.K. Therning	Deputy Associate Director of Research for Business Operations	3000.1
Ms. G.L. Spisak	Special Assistant	3001
Ms. D.K. Martin	Head, ADP Project Management Office	3004
Mr. J. McCutcheon	Head, Office of Counsel	3008
Mr. J. Ely	Head, Contracting Division	3200
Mr. D.K. Therning	Comptroller	3300
Ms. C. Hartman	Head, Supply Division	3400
Mr. S.D. Harrison	Director, Research and Development Services Division	3500

Point of contact: Ms. G.L. Spisak, Code 3001, (202) 404-7462

^{*}Acting

Office of Counsel

Mr. J. McCutcheon

Code 3008

Basic Responsibilities

The Office of Counsel is responsible for providing legal services to NRL's management in all areas of general, administrative, intellectual property, and technology transfer law. The Office reviews all procurement-related actions; reviews NRL scientific papers prior to publication; prepares patent applications and prosecutes the applications through the Patent and Trademark Office; defends against contract protests, other contract litigation and personnel cases; and advises on other legal matters relating to technology transfer, personnel, fiscal, and environmental law.

NRL Counsel also serves as legal advisor to the Commanding Officer and Director of Research.

Personnel: 25 full-time civilian

Key Personnel

Name	Title	Code
Mr. J. McCutcheon	Head, Office of Counsel	3008
Mr. C. Steenbuck	Associate Counsel/General Law	3008.1
Mr. T. McDonnell	Associate Counsel/Intellectual Property	3008.2
Mr A Beede	Associate Counsel/SSC Legal Matters	3008.3

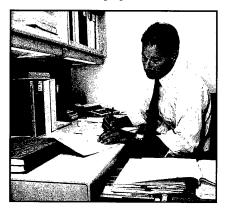
Point of contact: Ms. K. Head, Code 3008A, (202) 767-7606

Contracting Division

Code 3200

- Advance Acquisition Planning
- Acquisition Strategies
- Acquisition Training
- Contract Negotiations
- Contractual Execution
- Contract Administration
- Acquisition Policy Interpretation and Implementation
- Small Business

Contract specialist prepares contract award



Procurement Information Processing System (PIPS) coordinator consults with procurement technician and PIPS hotline representative

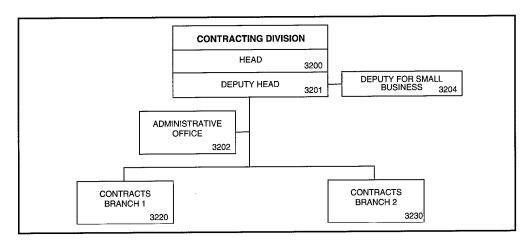




Deputy Division Head conducts staff meeting



Mr. J. Ely



The Contracting Division is responsible for the acquisition of major research and development, materials, services, and facilities where the value is in excess of \$100,000. It also maintains liaison with the ONR Procurement Directorate on procurement matters involving NRL. Specific functions include: providing consultant and advisory services to NRL division personnel on acquisition strategy, contractual adequacy of specifications, and potential sources; reviewing procurement requests for accuracy and completeness; initiating and processing solicitations for procurement; awarding contracts; performing contract administration and postaward monitoring of contract terms and conditions, delivery, contract changes, patents, etc., and taking corrective actions as required; providing acquisition-related training to division personnel; and interpreting and implementing acquisition-related Federal Department of Defense and Navy regulations.

Personnel: 40 full-time civilian

Key Personnel

Name	Title	Code
Mr. J. Ely	Head	3200
Ms. M.A. Carpenter	Deputy Head	3201
Ms. J. Halperson	Administrative Officer	3202
Ms. L.M. Byrne	Deputy for Small Business	3204
Ms. W. Cosby	Head, Contracts Branch 1	3220
Mr. J. Adams	Head, Contracts Branch 2	3230
Mr. J. Adams	Head, Contracts Section, SSC	3235

Point of contact: Ms. J. Halperson, Code 3202, (202) 767-3749

Financial Management Division

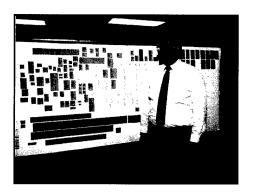
Code 3300

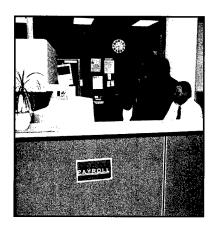
- Budget
- Reports and Statistics
- Accounting
- Travel Services
- Payroll Liaison
- Management Information Systems



The Budget Branch prepares various financial analyses, reports, and studies in response to external data calls and/or management requests

The MIS Branch operates, designs, implements, and controls the administrative and business information system for NRL

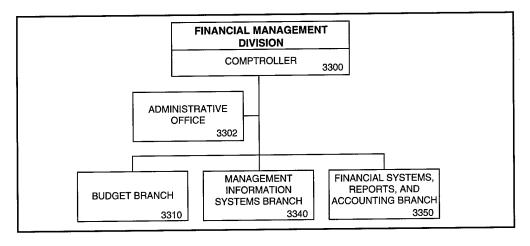




The Financial Services Section coordinates efforts with DFAS to complete payment transactions related to NRL business, such as personnel for payroll and travel expenses



Mr. D.K. THERNING



The Financial Management Division (FMD), headed by the NRL Comptroller, develops, coordinates, and maintains an integrated system of financial management that provides the Commanding Officer, the Director of Research, and other officials of NRL the information and support needed to fulfill the financial and resource management aspects of their responsibilities. FMD translates the NRL program requirements into the financial plan, formulates the NRL budget, monitors and evaluates performance with the budget plan, and provides recommendations and advice to NRL management for corrective actions or strategic program adjustments. FMD maintains the accounting records of NRL's financial and related resources transactions and prepares reports, financial statements, and other documents in support of NRL management needs and/or to comply with external reporting requirements. FMD provides financial management guidance, policies, advice, and documented procedures to ensure that NRL operates in compliance with Navy and DoD regulations and with economy and efficiency. FMD coordinates efforts with the Defense Finance and Accounting Service (DFAS) to complete payment transactions related to NRL business (e.g., the payment of NRL personnel for payroll and travel expenses and the payment to NRL's contractors and vendors for goods and services purchased by NRL). Additionally, FMD develops, operates, and maintains automated business and management information systems supporting the lab-wide administrative and business processes, including financial management, procurement and contracting, stores and inventory, asset management, human resources, facilities, and security.

Personnel: 101 full-time civilian

Key Personnel

Name	Title	Code
Mr. D.K. Therning Ms. A.J. Downs Ms. D.L. Rippey Mr. D.K. Therning* Mr. J.V. Thomas Mr. M. Mann Mr. D. Tyndall Ms. A. Cutchember	Comptroller Administrative Officer Head, Budget Branch Head, Management Information Systems Branch Head, Financial Systems, Reports, and Accounting Branch Head, Cost Accounting Section Head, Financial Services Section Head, Payroll Services Unit	3300 3302 3310 3340 3350 3351 3352 3352.1
Ms. T. Frye Ms. D. Edwards	Head, Travel Services Unit Head, Asset Management Unit	3352.2 3352.3

Point of contact: Ms. A.J. Downs, Code 3302, (202) 767-2950

^{*}Acting

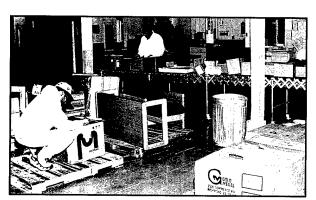
Supply Division

Code 3400

- Disposal and Storage
- Store Material Issues
- Customer Liaison
- Automated Inventory Management System
- PurchasingReceipt ControlMaterial Control
- Technical

Inspection and delivery preparation for incoming material

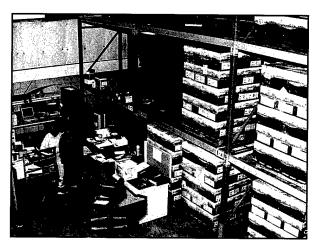




Central Receiving in building 49 warehouse

Customers and employees at the Supply store

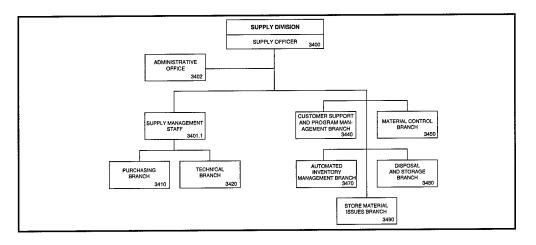




Bulk storage area at the Supply store



Ms. C. HARTMAN



The Supply Division provides the Laboratory and its field activities with contracting, supply management, and logistics services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, storing, and delivering material and equipment; packing, shipping, and traffic management; surveying and disposing of excess and unusable property; operating various supply issue stores and performing stock inventories; providing technical and counseling services for the research directorates in the development of specifications for a complete procurement package; and obtaining and providing guidance in the performance stages of contractual services.

Personnel: 98 full-time civilian

Key Personnel

Name	Title	Code
Ms. C. Hartman Mr. J. Booros Ms. A. Olson Ms. M. Smith Mr. G. Smith Ms. P. Carter Mr. W. Myers	Supply Officer Head, Supply Management Staff Administrative Officer Head, Purchasing Branch Head, Technical Branch Head, Customer Support and Program Management Branch Head, Material Control Branch	3400 3401.1 3402 3410 3420 3440 3450
Ms. L. Shaw Ms. P. Carter* Mr. M. Clark	Head, Automated Inventory Management Branch Head, Disposal and Storage Branch Head, Store Material Issues Branch	3470 3480 3490

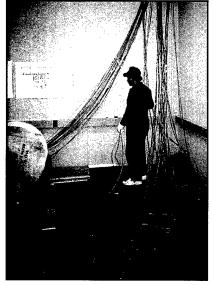
Point of contact: Ms. A. Olson, Code 3402, (202) 767-3871

^{*}Acting

Research and Development Services Division

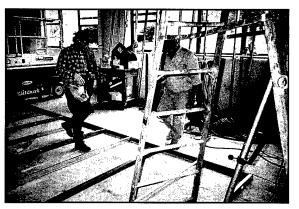
Code 3500

- Technical/Support Services
- Operations
- Shop Services
- Chesapeake Bay Section
- Customer Liaison



Installing fiber optic lines

Installation of Research Facility

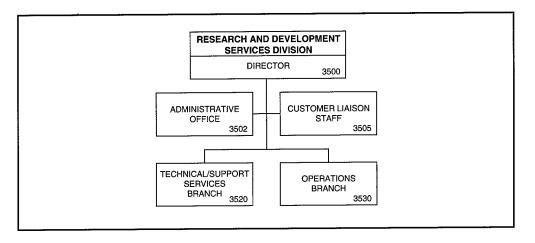




Machine Shop Research Support



Mr. S. Harrison



The Research and Development Services Division is responsible for the physical plant of the Naval Research Laboratory and subordinate field sites. The responsibilities include military construction, engineering, construction, facility support services, planning, maintenance/repair/operation of all infrastructure systems, and transportation.

The Division provides engineering and technical assistance to research divisions in the installation and operation of critical equipment in support of the research mission.

Personnel: 129 full-time civilian

Key Personnel

Name	Title	Code
Mr. S. Harrison	Director	3500
Ms. L. Jones	Administrative Officer	3502
Mr. P. Le	Head, Customer Liaison Staff	3505
Mr. T. Hull	Head, Technical/Support Services Branch	3520
Mr. T. Miller	Head, Engineering Section	3521
Mr. M. Kosky	Head, Chesapeake Bay Section	3522
Mr. J. Headley	Head, Shop Services Section	3523
Mr. F. Regalia	Head, Operations Branch	. 3530
Mr. J. Schultz	Head, Production Control Section	3531

Point of contact: Ms. L. Jones, Code 3502, (202) 767-2168

Systems Directorate

SYSTEMS DIRECTORATE

Code 5000

The Systems Directorate applies the tools of basic research, concept exploration, and engineering development to expand operational capabilities and to provide materiel support to Fleet and Marine Corps missions. Emphasis is on technology, devices, systems, and know-how to acquire and move warfighting information and to deny these capabilities to the enemy. Current activities include:

- New and improved radar systems to detect and identify ever smaller targets in the cluttered littoral environment;
- Optical sensors and related materials to extract elusive objects in complex scenes when both processing time and communications bandwidth are limited;
- Unique optics-based sensors for detection of biochemical warfare agents and pollutants, for monitoring structures, and for alternative sensors;
- Advanced electronic support measures techniques for signal detection and identification;
- Electronic warfare systems, techniques, and devices including quick-reaction capabilities;
- Innovative concepts and designs for reduced observables;
- Techniques and devices to disable and/or confuse enemy sensors and information systems;

- Small "intelligent"/autonomous land, sea, or air vehicles to carry sensors, communications relays, or jammers; and
- High performance/high assurance computers with right-the-first-time software and known security characteristics despite commercial off-the-shelf components and connections to public communications media.

Many of these efforts extend from investigations at the frontiers of science to the support of deployed systems in the field, which themselves provide direct feedback and inspiration for applied research and product improvement and/or for quests for new knowledge to expand the available alternatives.

In addition to its wide-ranging multidisciplinary research program, the Directorate provides support to the Corporate Laboratory in shared resources for High Performance Computing and Networking, Technical Information collection and distribution and in coordination of Laboratory-wide efforts in Signature Technology, Counter-Signature Technology, Theater Missile Defense, and the Naval Science Assistance Program.

Associate Director of Research for Systems



Dr. R.A. LeFande was born on Staten Island, New York on February 8, 1941. He attended the Brooklyn Technical High School and obtained his undergraduate degree in physics from the University of Rhode Island in 1962. After a brief tour as a telephone equipment engineer with Western Electric Company in New York City, he returned to academic pursuits, earning a Master's degree in physics from the Rutgers University in 1965.

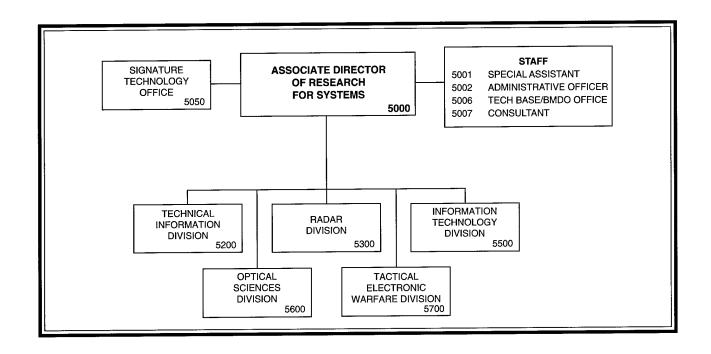
In July of 1965, Dr. LeFande joined the Naval Research Laboratory as a research physicist in the Satellite Communications Branch. He worked on a variety of projects related to the

design of waveforms for Naval applications, calibration of antennas and path losses by methods borrowed from radio astronomy, and on the design and acquisition of satellite communication terminals for shipboard and submarine use. By drawing on this work for a thesis topic, he obtained his Ph.D. from the University of Maryland in 1973, in the areas of astronomy and astrophysics.

In 1976, Dr. LeFande became Head of the Special Communications Branch where he nurtured and encouraged an NRL team of scientists and engineers in the development of satellite communications terminals that are now being deployed in the Fleet, and in establishing the scientific understanding and practical design principles that contributed to the selection of waveforms for MILSTAR and other systems.

From 1979 to 1981, Dr. LeFande was Technical Director and System Engineer of the Special Communication Project of the Naval Electronic Systems Command. He oversaw several research and acquisition programs related to submarine communications, which covered the spectrum from extremely low frequencies through optics and included the maintenance and operation of a worldwide network of radio transmitter facilities. After termination of the project and a brief tour as Deputy Director, Research and Technology Group, Dr. LeFande returned to NRL as Superintendent of the Aerospace Systems Division. Here he guided a diverse program of basic and applied research in Wide Area Surveillance Systems, Space Warfare, and in related areas of physical science, materials, and device technology. From 1983 to 1990, Dr. LeFande served as Associate Deputy Assistant Secretary of the Navy (C³I and Space), providing technical and philosophical advice to eight assistant and deputy assistant secretaries. In this capacity, he took a keen interest in the issues of acquisition management reform and of the appropriate roles and missions of the Laboratory and the other Centers in the acquisition process. During this tour, Dr. LeFande was selected as a Legis Fellow and served on the staff of Representative Byron for six months in 1989, working on a variety of issues and legislation related to the Armed Services, Science and Technology, Foreign Affairs, and other matters.

Dr. LeFande returned to the Laboratory in October 1990, where he served on the staff of the Director of Research. He was designated Acting Associate Director of Research in February 1991, and Associate Director of Research in February 1992.



Key Personnel

Name	Title	Code
Dr. R.A. LeFande	Associate Director of Research for Systems	5000
Ms. B.J. Turner	Special Assistant	5001
Ms. D. Ernst	Administrative Officer	5002
Dr. S. Sacks	Head, Technology Base/Ballistic Missile Defense	
	Organization Office	5006
Dr. M.I. Skolnik	Consultant	5007
Dr. D.W. Forester	Head, Signature Technology Office	5050
Mr. T. Calderwood	Head, Technical Information Division	5200
Dr. G.V. Trunk	Superintendent, Radar Division	5300
Dr. R.P. Shumaker	Superintendent, Information Technology Division	5500
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	5600
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700

Point of contact: Ms. S.S. Harris, Code 5000A, (202) 767-3324



Dr. S. SACKS

Technology Base/Ballistic Missile Defense Organization (BMDO) Office Code 5006

The Head of the Technology Base/BMDO Office carries out program management activities pertaining to the Navy BMD, SBIR, 6.3 A ATD, critical technology, and other technology efforts. Mission activities include assurance of technical quality and program relevance, technology philosophy, orientation of the program to priority needs and transition opportunities, and overall coordination of NRL efforts. He is the Laboratory point of contact with the Program Offices for this work.



Dr. M.I. Skolnik

Consultant Code 5007

The radar consultant provides expert advice, historical perspectives, analyses, and investigations in the field of radar, related systems, phenomenology, and applications to the Systems Directorate, NRL, the Navy, and other DoD organizations as requested.

Signature Technology Office



Dr. D.W. Forester

Code 5050

- Electromagnetic Scattering Fundamentals
- Low Observables Materials
- Multidisciplinary Program Management
- Technology Transfer

Basic Responsibilities

The NRL Signature Technology Office (STO) performs research and manages/coordinates an integrated, comprehensive research and development program at NRL addressing all aspects of signature control and countersignature control as they apply to Navy weapons systems. The STO monitors and evaluates signature control technology development efforts within government and industry and facilitates the incorporation of advanced signature control technologies into present and future Navy systems. It provides a central point of contact for outside agencies on matters concerning the STO program.

Personnel: 15 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.W. Forester	Research Physicist	5050

Point of contact: Ms. N.A. Carpenter, Code 5050A, (202) 767-3116

Technical Information Division

Code 5200

- NRL Historian
- Navy Acquisition Research and Development Information Center (NARDIC)
- Research Library and Technical Information Center
- Publications, Graphic Design, and Printing Services
- Photographic, Video, and Imaging Services
- Exhibits/Multimedia
- Auditorium Services
- Administrative Services

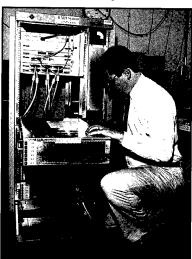
The Multimedia Center has the capability of authoring/producing multimedia programs. The Center uses two complete multimedia systems with Macromedia Director and Adobe Photoshop and a digital video editing system, the AVID Media Composer 1000.





Mail clerks sort mail by directorate and file into bins by organizational codes. Mail is bundled and delivered twice a day.

The Library uses a 3.24 GB SPARC Storage RAID array to cache PDF files of the more than 160 journals it networks to NRL/ ONR researchers through its Web-based TORPEDO system. In



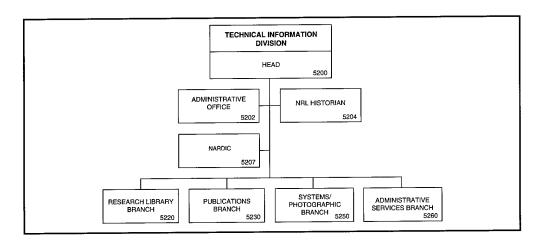
addition, TOR-PEDO, as the centerpiece of the Library's Digital Library Initiative, provides access to about 5,000 research reports, reprints of publications by NRL authors, and NRL press releases.



The Publications Branch staff reviews press sheets for one of NRL's publications



Mr. T. CALDERWOOD



The Technical Information Division (TID) provides centralized support to the Laboratory, and sometimes the Office of Naval Research, by collecting, retaining, processing, publishing, presenting, and distributing information in various forms to many audiences.

TID supports the Laboratory by providing a full range of library services; by editing and publishing reports and publications; by performing specialized scientific and general photographic services, illustration and graphic design services, imaging support, scientific composition, and special projects graphics; and by providing photographic and video data-gathering and editing services.

Personnel: 95 full-time civilian

Key Personnel

Name	Title		Code
Mr. T. Calderwood	Head		5200
Ms. M.B. Gutierrez	Administrative Officer		5202
Dr. D. van Keuren	NRL Historian		5204
Ms. L. Rice	Navy Acquisition Research and Development		
	Information Center (NARDIC)		5207
Ms. L. Stackpole	Head, Research Library Branch	V +	5220
Ms. K. Parrish*	Head, Publications Branch		5230
Mr. J. Lucas	Head, Systems/Photographic Branch		5250
Ms. L. Warder	Head, Administrative Services Branch		5260

Point of contact: Mr. T. Calderwood, Code 5200, (202) 767-2187

^{*}Acting

Radar Division

Code 5300 Staff Activity Areas

Systems research

Electromechanical design

Multifunction RF systems

Research Activity Areas

Radar Analysis

Target signature prediction Electromagnetics and antennas Airborne early-warning radar (AEW) Inverse synthetic aperture radar (ISAR) Space-time adaptivity

Advanced Radar Systems

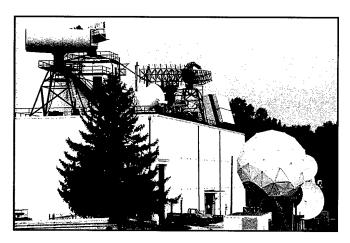
High-frequency over-the-horizon radar Signal analysis Signal processing and equipment Computer Aided Design (CAD)

Search Radar

Radar systems
Shipboard surveillance radar
Electromagnetic Compatibility/Electromagnetic
Interference (EMC/EMI)
Mark XII IFF improvements
Future identification technology

Target Characteristics

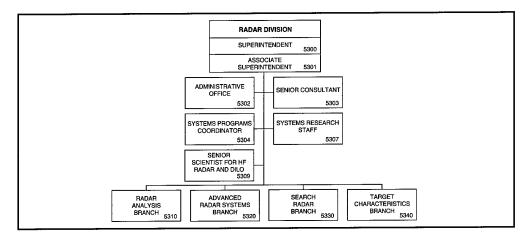
Ship self defense Electronic counter-countermeasures Target signature recognition



Radar test site at Building 75, Chesapeake Bay Section (Chesapeake Beach, MD) showing radar antennas used in experimental development by the Radar Division. On the roof, from left to right: experimental 3-D elevation phase scanned antenna for SENRAD, an experimental L-Band system; a directed mirror antenna (DMAR); and antennas for the SPS-49, SPS-10, IFF, SPS-40, and the fixed array surveillance radar (FASR). On the ground from left to right are antennas for: SPQ-9B advanced development model (in radome); a high resolution X-band clutter radar; and the high range resolution monopulse (HRRM) system.



Dr. G.V. Trunk



The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analyses and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors that are applicable to enhancing the Navy's ability to fulfill its mission.

Personnel: 97 full-time civilian

Key Personnel

Name	Title	Code
Dr. G.V. Trunk	Superintendent	5300
Mr. E.E. Maine	Associate Superintendent	5301
Ms. C.A. Hill	Administrative Officer	5302
Mr. P.K. Hughes II	Senior Consultant	5303
Mr. D.F. Hemenway	Systems Programs Coordinator	5304
Mr. R.T. Ford	Head, Systems Research Staff	5307
Mr. J.M. Headrick	Senior Scientist for HF Radar and DILO	5309
Dr. W.P. Pala	Head, Radar Analysis Branch	5310
Mr. J.P. Letellier	Head, Advanced Radar Systems Branch	5320
Mr. J. Pavco	Head, Search Radar Branch	5330
Dr. B.H. Cantrell	Head, Target Characteristics Branch	5340

Point of contact: Dr. G.V. Trunk, Code 5300, (202) 767-2573

Information Technology Division

Code 5500 Research Activity Areas

Navy Center for Applied Research in Artificial Intelligence

Case-based reasoning
Natural language interfaces
Intelligent tutoring
Machine learning
Robotics software and computer vision
Neural networks
Novel devices/techniques for HCI
Voice processing (synthesis, recognition, transmission, etc.)
Man-in-loop interface evaluation

Transmission Technology

Arctic communication
Submarine communication technology
Communication system architecture
Communication antenna/propagation technology
Communications intercept systems
Signal analysis systems
Virtual engineering

Center for High Assurance Computer Systems

Security architecture
Formal specification/verification of system security
COMSEC application technology
Secure networks
Secure databases
Software engineering for secure systems
Key management and distribution
Certification and Infosec Engineering
Formal methods for requirements specification and verification
Tools for real-time software development



Center for Computational Science metacomputer facility

Communication Systems

Network design
Reliable multicast protocols
Tactical communication system engineering
Distributed simulation and prototyping
Quality of service protocols
Integrated voice and data
Next-generation secure voice terminal
Integrated IP and ATM multicasting
ATM crypto (fastlane) testing
Tactical/warfighter's internetworking
NILE (NATO Improved Link Eleven)

Advanced Information Technology

Command decision support
Parallel computing
Joint C4ISR and operational M&S systems
Data fusion technology
Real-time parallel processing
Distributed simulation
Scalable high performance computing
Processing graph method
Signal processing applications
Image processing
Virtual reality
Goal-oriented computational steering
Natural environments for distributed simulation

Center for Computational Science

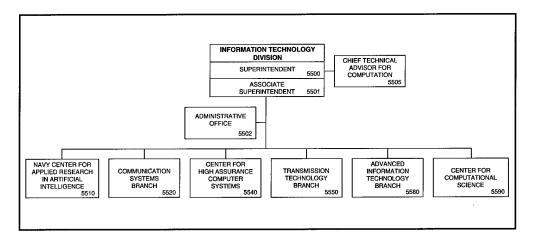
Network research and design Parallel computing Scalable high performance computing Distributed computing environments Scientific visualization Advanced ATM/SONET networking Video streaming technology

> Mobile robots are used in experiments at the Navy Center for Applied Research in Artificial Intelligence to study sensor-based control and adaptive rehavior





DR. R.P. SHUMAKER



The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information to provide a basis for improving the conduct of military operations. The organization of the Division is directed toward addressing the technologies and subsystems necessary to develop architectures and system designs for the next-generation battleforce warfare systems.

Personnel: 195 full-time civilian

Key Personnel

Name	Title	Code
Dr. R.P. Shumaker	Superintendent	5500
Mr. W.D. Long	Associate Superintendent	5501
Ms. J. Saunders	Administrative Officer	5502
Dr. H. Dardy	Chief Technical Advisor for Computation	5505
Dr. A.L. Meyrowitz	Director, Navy Center for Applied Research	
Ž	in Artificial Intelligence	5510
Mr. E.L. Althouse	Head, Communication Systems Branch	5520
Dr. J.D. McLean	Director, Center for High Assurance Computer Systems	5540
Mr. E.J. Kennedy	Head, Transmission Technology Branch	5550
Dr. S.K. Numrich	Head, Advanced Information Technology Branch	5580
Mr. J. Lockard	Director, Center for Computational Science	5590

Point of contact: Mr. W.D. Long, Code 5501, (202) 767-2954

Optical Sciences Division

Code 5600 Staff Activity Areas

Program analysis and development Special systems analysis Technical study groups Technical contract monitoring Theoretical studies Navy Science Assistance Program (NSAP)

Research Activity Areas

Infrared Materials and Chemical Sensors

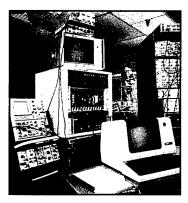
Advanced infrared glasses and fibers IR fiber-optic materials and devices IR fiber chemical sensors
Fiber environmental sensors

Optical Physics

Laser materials diagnostics
Nonlinear frequency conversion
Optical instrumentation and probes
Optical seeker studies
Optical interactions in semiconductor
superlattices and organic solids
Laser-induced reactions
Beam cleanup technology

Applied Optics

Detection signal processing studies
Optical and IR countermeasures
Optical technology
Ultraviolet component development and UV
countermeasures
Multispectral sensors and processing
Missile warning sensor technology
UV, visible, and IR imager development
Framing reconnaissance sensors



The Focal Plane Array Evaluation Facility consists of the optical sources and electronics required to evaluate monolithic or hybrid infrared focal plane arrays that use chargecoupled device, chargeinjection device, direct readout, or chargeimaging matrix technologies

Photonics Technology

Diode laser applications
Fiber and solid-state laser/sources
High-speed (<100 fs) optical probing
High-power fiber amplifier
High-speed optical networks
Antenna remoting
RF filters and processes
Photonic control of phased arrays
Photonic analog to digital conversion

Advanced Concepts

IR Range Facility
IR low observables
Multispectral/hyperspectral/detection algorithms
EO/IR systems analysis
Airborne IR search and track technology
Atmospheric IR measurements
Ship IR signatures

Optical Techniques

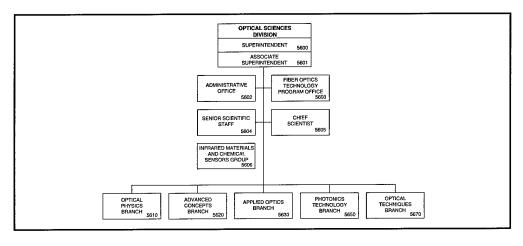
Radiation effects
Fiber lasers/sources and amplifiers
Fiber-optic materials and fabrication
Fiber Bragg grating sensors/systems for smart
structures
Fiber-optic sensors/systems (acoustic, magnetic,
gyroscopes)
Integrated optics
Optical sources for sensors



The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors



Dr. T.G. GIALLORENZI



The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near-ultraviolet and far-infrared wavelengths. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices, materials, and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis, prototype system development, and exploitation of R&D results for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, laser physics, optical waveguide technologies, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical data processing, fiber-optic sensor systems, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, optical recording materials, and optical diagnostic techniques. A significant portion of the effort is devoted to developing, analyzing, and using special optical materials. Various field measurement programs on optical problems of specific interest are also conducted.

Personnel: 137 full-time civilian

Key Personnel

Name	Title	Code
Dr. T.G. Giallorenzi	Superintendent	5600
Dr. C. Hoffman	Associate Superintendent	5601
Ms. M. Atkinson	Administrative Officer	5602
Mr. G. Cogdell	Head, Fiber Optics Technology Program Office	5603
Dr. J. Reintjes*	Head, Senior Scientific Staff	5604
Dr. L. Esterowitz	Chief Scientist	5605
Dr. I. Aggarwal	Head, Infrared Materials and Chemical Sensors Group	5606
Dr. A.J. Campillo	Head, Optical Physics Branch	5610
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch	5620
Dr. R.A. Patten	Head, Applied Optics Branch	5630
Dr. R. Esman	Head, Photonics Technology Branch	5650
Dr. A. Dandridge	Head, Optical Techniques Branch	5670

Point of contact: Ms. M. Atkinson, Code 5602, (202) 767-6986

^{*}Acting

Tactical Electronic Warfare Division

Code 5700 Staff Activity Areas

EW strategic planning Information Warfare Technology Program EW lead laboratory coordinator Navy Science Assistance Program (NSAP) Communications CM group Effectiveness of Naval EW Systems (ENEWS) Facility operations unit

Research Activity Areas

Offboard Countermeasures

Expendable technology and devices Unmanned air vehicles Offboard payloads Decoys

Airborne Electronic Warfare Systems

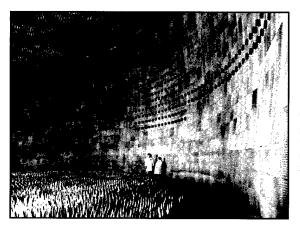
Air systems development Penetration aids Power source development Jamming and deception Millimeter-wave technology

Ships Electronic Warfare Systems

Ships systems development Jamming technology Deception techniques EW antennas

Electronic Warfare Support Measures

Intercept systems and direction finders RF signal simulators Systems integration Command and control interfaces Signal processing

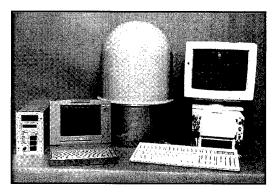


Advanced Techniques

Analysis and modeling simulation New EW techniques Experimental systems EW concepts Infrared technology

Integrated EW Simulation

Hardware-in-the-loop simulation Data management technology Flyable ASM seeker simulators Foreign military equipment exploitation

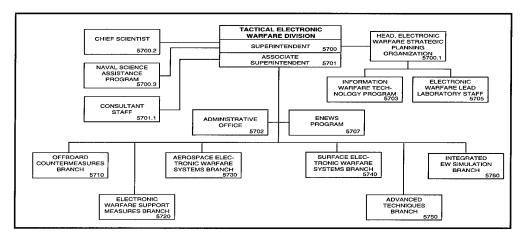


Using the latest composite, MIMIC and processing technologies, the Tactical Electronic Warfare Division has developed a small, lightweight, and inexpensive ESM receiving system for use on frigates, Coast Guard vessels, and various patrol aircraft

The Central Target Simulator (CTS) Programmable Array is part of a large hardware-in-the-loop simulation facility whose purpose is to test and evaluate electronic warfare systems and techniques used to counter the radar guided missile threat to Navy forces



Dr. J.A. MONTGOMERY



The Tactical Electronic Warfare Division (TEWD) is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, and supporting counter-countermeasures, as well as studies, analyses, and simulations for determining and improving the effectiveness of these systems.

Personnel: 272 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.A. Montgomery	Superintendent	5700
Dr. C.H. Heider	Head, Electronic Warfare Strategic Planning Organization	5700.1
Dr. W.E. Howell	Chief Scientist	5700.2
Ms. S. Bales	Head, Naval Science Assistance Program	5700.3
Mr. A.A. DiMattesa	Associate Superintendent	5701
Mr. A.A. DiMattesa [†]	Consultant Staff	5701.1
Ms. J.C. Johnson	Administrative Officer	5702
Mr. T. Jones	Head, Information Warfare Technology Program	5703
Mr. T.J. Jesswein	Head, Electronic Warfare Lead Laboratory Staff	5705
Dr. A.N. Duckworth	Manager, ENEWS Program	5707
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch	5710
Mr. R.D. Oxley	Head, Electronic Warfare Support Measures Branch	5720
Dr. W.W. Everett	Head, Aerospace Electronic Warfare Systems Branch	5730
Dr. J.P. Lawrence	Head, Surface Electronic Warfare Systems Branch	5740
Dr. R.H. Evans	Head, Advanced Techniques Branch	5750
Mr. B.W. Edwards	Head, Integrated EW Simulation Branch	5760

Point of contact: Mr. A.A. DiMattesa, Code 5701, (202) 767-5974

[†]Additional duty

Materials
Science and
Component
Technology
Directorate

MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

Code 6000

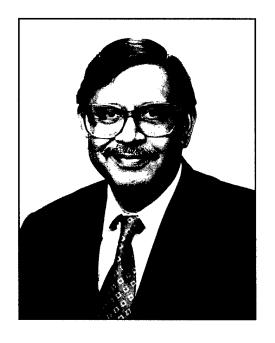
The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery and exploitation of new improved materials, the generation of new concepts associated with materials behavior, and the development of advanced components based on these new and improved materials and concepts. Theoretical and experimental research is carried out to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet important naval needs for advanced platforms, electronics, sensors, and photonics. The program includes investigations of a broad spectrum of materials including insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, and artificially structured bio/molecular materials and composites, which are used in important naval devices, components, and

systems. New techniques are developed for producing, processing, and fabricating these materials for crucial naval applications.

The synthesis, processing, properties, and limits of performance of these materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

Additionally, major thrusts are directed in advanced space sensing, reactive flow physics, computational physics, and plasma sciences. Areas of particular emphasis include fluid mechanics and hydrodynamics, nuclear weapon effects simulations, high-energy density storage devices, interactions of various types of radiation with matter, survivability of materials and components, and directed energy devices.

Associate Director of Research for Materials Science and Component Technology



Dr. B.B. Rath was born in Banki, India, on October 28, 1934. He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

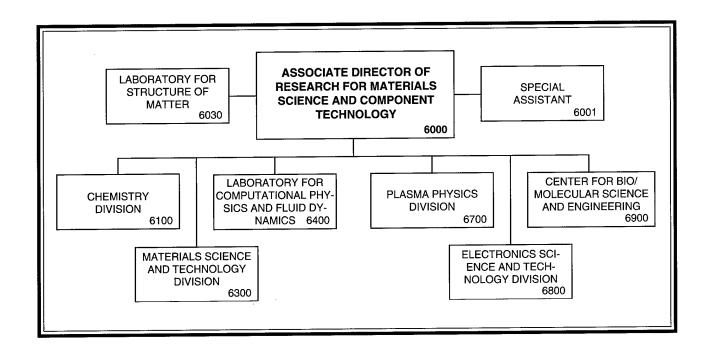
Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Group of the McDonnell Douglas Research Laboratories in St.

Louis, Missouri, until he came to NRL as Head of the Physical Metallurgy Branch. During this period, he was adjunct Professor at the Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

Dr. Rath is recognized in the fields of solid-state transformations, grain boundary migrations, and structure-property relationships in metallic systems. He has published over 140 papers in these fields and edited several books and conference proceedings.

Dr. Rath serves on several planning, review, and advisory boards for both the Navy and the Department of Defense, as well as for the National Materials Advisory Board of the National Academy of Sciences, Carnegie-Mellon University, University of Virginia, Colorado School of Mines, University of Pittsburgh, University of Connecticut, University of Maryland, Carnegie-Mellon University, and Florida Atlantic University. He serves as the Navy representative and as the National leader to the Materials and Structures Subgroup of The Technical Cooperation Program (TTCP) countries and the Indo-U.S. Joint Commission on Science and Technology.

Dr. Rath is a fellow of the Minerals, Metals, and Materials Society (TMS), American Society for Materials-International (ASM), Washington Academy of Sciences, Indian Academy of Engineering, and Materials Research Society of India. He has received the 1991 George Kimball Burgess Memorial Award, TMS Leadership Award, and the Charles S. Barrett Medal for his contributions to Materials Research. He has served as chairperson of several technical committees of TMS, ASM, and AAES, and serves in the editorial boards of three international materials research journals. He is a member of the Board of Trustees of ASM-International and the Federation of Engineering Societies, and Board of Directors of The Materials Society (TMS).



Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Materials Science	
	and Component Technology	6000
Mr. R.A. Gray	Special Assistant	6001
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. J.S. Murday	Superintendent, Chemistry Division	6100
Dr. D.U. Gubser	Superintendent, Materials Science and Technology Division	6300
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational	
,	Physics and Fluid Dynamics	6400
Dr. S.L. Ossakow	Superintendent, Plasma Physics Division	6700
Dr. G.M. Borsuk	Superintendent, Electronics Science and Technology Division	6800
Dr. I. Schnur	Director, Center for Bio/Molecular Science and Engineering	6900

Point of contact: Mrs. J. Smithwick, Code 6000A, (202) 767-2538

Dr. Jerome Karle recipient of 1985 Nobel Prize in Chemistry



Dr. Jerome Karle's research has been concerned with diffraction theory and its application to the determination of atomic arrangements in various states of aggregation, gases, liquids, amorphous solids, fibers, and macromolecules. This research has resulted in new techniques for structure determination and a broad variety of applications. His work in crystal structure analysis was recognized by the 1985 Nobel Prize in Chemistry.

Dr. Karle is a Fellow of the American Physical Society, a member of the National Academy of Sciences, and the American Philosophical Society. He has served as president of the International Union of Crystallography, and is a member of a number of other professional societies. He has been chairman of the Chemistry Section of the National Academy of Sciences. Some time ago, he was a Professorial Lecturer in the University College of the University of Maryland and a Visiting Professor at the University of Kiel in Germany. He has also lectured at many international schools and symposia and has served on a number of international scientific organizations.

Laboratory for Structure of Matter

Code 6030



Dr. J. KARLE

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of X-ray, electron, and neutron diffraction are used in a broad program of structural studies that can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines. Structural investigations relate structure to function, facilitate industrial syntheses and the creation of new materials with improved properties, and provide foundation information for numerous associated disciplines and studies. Applications are made, for example, to propellants, explosives, dense energetic materials, absorptive carbons, metallic glasses, device materials, ion carriers, antibiotics, analgesics, reversible oxygen carriers, and synthetic reaction intermediates and final products.

Personnel: 10 full-time civilian

Key Personnel

Name	Title	Code
Dr. I. Karle	Chief Scientist	6030

Point of contact: Mrs. M. Williams, Code 6030, (202) 767-3496

Chemistry Division

Code 6100 Staff Activity Areas

The Environment and Biotechnology Program Manager

Research Activity Areas

Chemical Diagnostics

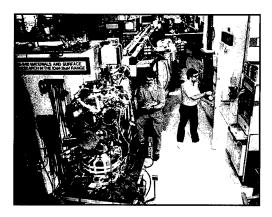
Optical diagnostics of chemical reactions Kinetics of gas phase reactions Trace analysis Atmosphere analysis and control Ion/molecule processes Environmental chemistry Explosive stability

Materials Chemistry

Synthesis and evaluation of innovative polymers
Functional organic coatings
Polymer characterization
Quality control methodology
Degradation and stabilization mechanisms
High-temperature resins
OMCVD materials
Corrosion prevention
Mobility fuels

Dynamics of Solids

X-ray sources, optics, and detectors
X-ray analysis of materials—composition and structure
Synchrotron radiation applications
Radiation detection and measurement
UV optical properties of materials
Environmental analysis



The NRL National Synchrotron Light Source research station for materials and surface research

Center for Corrosion Science and Engineering

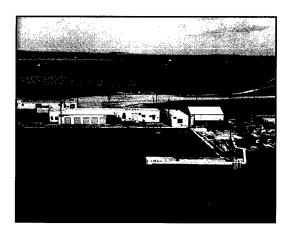
Materials failure analysis
Marine coatings
Cathodic protection
Corrosion Science
Environmental fracture and fatigue
Corrosion control engineering

Surface/Interface Chemistry

Tribology
Surface properties of materials
Surface/interface analysis
Chemical microdetectors
Surface reaction dynamics
Diamond films
Beam-enhanced chemistry
Electrochemistry

Safety and Survivability

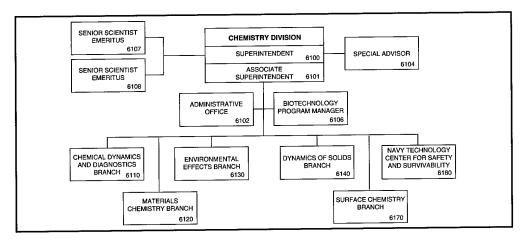
Combustion dynamics
Fire protection and suppression
Personnel protection
Modeling and scaling of combustion systems
Chemical and biological defense



The Key West site of the NRL Center for Corrosion Science and Engineering specializes in understanding and modeling of the marine environments impact on Naval materials. A complete laboratory for the study of corrosion control technologies provides sponsors with prototypical seawater exposure of their systems.



Dr. J.S. Murday



The Chemistry Division conducts basic research, applied research, and development studies in the broad fields of chemical diagnostics, reaction rate control, materials chemistry, surface and interface chemistry, environmental chemistry, and ship safety and survivability. Specialized programs within these fields include chemical vapor precursors, coatings, functional polymers/elastomers, clusters, controlled release of energy, chemical sensors, physical and chemical characterization of surfaces, properties of nanometer structures, tribology, chemical vapor deposition/etching, atmosphere analysis and control, environmental protection/reclamation, prevention/control of fires, mobility fuels, and solution chemistry.

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Navy Technology Center for Safety and Survivability performs RDT&E on fire and personnel protection, fuels, chemical defense, submarine atmospheres, and damage control aspects of ship and aircraft survivability; supports Navy and Marine Corps requirements in these areas; and acts as a focus for technology transfer in safety and survivability.

Personnel: 95 full-time civilian; 7 full-time military

Key Personnel

Name	Title	Code
Dr. J.S. Murday	Superintendent	6100
Vacant	Associate Superintendent	6101
Ms. B.L. Russell	Administrative Officer	6102
Dr. R. Holst	Special Advisor	6104
CDR A. Churilla, MSC, USN	Biotechnology Program Manager	6106
Dr. D.L. Venezky	Senior Scientist Emeritus	6107
Dr. H.W. Carhart	Senior Scientist Emeritus	6108
Dr. J. McDonald	Head, Chemical Dynamics and Diagnostics Branch	6110
Dr. L. Buckley	Head, Materials Chemistry Branch	6120
Mr. E.D. Thomas	Head, Environmental Effects Branch	6130
Mr. M.E. Bell	Head, Dynamics of Solids Branch	6140
Dr. R.J. Colton	Head, Surface Chemistry Branch	6170
Dr. F.W. Williams	Head, Navy Technology Center for Safety and Survivability	6180

Point of contact: Ms. B. Russell, Code 6102, (202) 767-2460

Materials Science and Technology Division

Code 6300 Research Activity Areas

Physical Metallurgy

Ferrous and intermetallic alloys Synthesis/processing of metals Welding technology Micro/nano structure characterization

Complex System Theory

Computational condensed matter physics and materials science

Applications of electronic structure theory to solids and clusters

Molecular dynamics

Quantum many-body theory

Theory of alloys

Superconductivity theory

Theoretical studies of phase transitions

Atomic physics theory

Directed Energy Effects

High-power microwave effects and countermeasures

Laser-hardened materials and systems

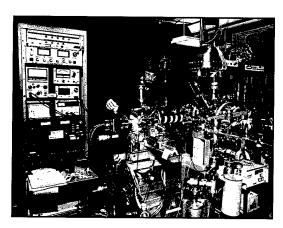
Laser point defense

Nanostructure optics

High-power laser interactions with materials and systems

Atomic and molecular interactions with surfaces and interfaces

Spectroscopy of superconductors



The growth of single crystal magnetic films on semiconductor substrates for electronic applications is observed

Surface Modification

Thin film deposition

Pulsed laser deposition

Ion beam assisted deposition

Variable balance magnetron sputtering

Ion engineering

Ion implantation

Reactive ion etching

Functional materials

Optoelectronics

Electroceramics

Chemical sensors

Analysis

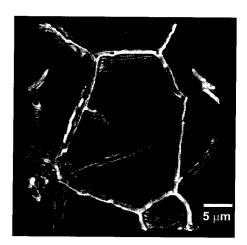
Surface analysis by accelerator techniques Trace element accelerator mass spectrometry Mechanical loss spectroscopy

Material Physics

Superconducting materials Magnetic materials Thermoelectric materials Nonlinear (chaotic) phenomena

Multifunctional Materials

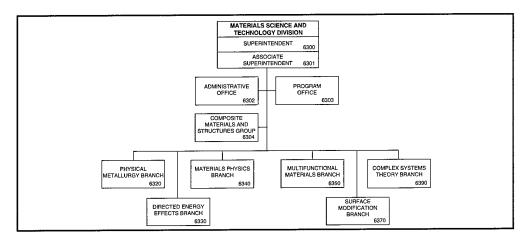
Mechanics of metallic and ceramic materials Nondestructive evaluation Smart materials/structures Synthesis and processing of ceramic materials



3D reconstruction of cementite precipitates in an austenite grain



Dr. D.U. Gubser



The Materials Science and Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials having substantive value to the Navy. R&D programs encompass the intrinsic behavior of metals, alloys, ceramics, glasses, and composites and their performance and reliability in naval structures and electrical devices. Program objectives include achieving fundamental understanding of the mechanical, physical, electrical, magnetic, superconducting, and electrochemical properties of materials; identifying composition, processing, and microstructural parameters to produce improved materials; and developing guidelines for the selection, design, and certification of materials new and improved functionality and for life-cycle management. This diversity of programs is carried out by interdisciplinary teams of material scientists, metallurgists, ceramists, physicists, chemists, and engineers, using the most advanced testing facilities and diagnostic techniques.

Personnel: 110 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.U. Gubser	Superintendent	6300
Dr. D.J. Michel	Âssociate Superintendent	6301
Mrs. S.A. McIntire	Administrative Officer	6302
Dr. S.C. Sanday	Head, Program Office	6303
Dr. R. Badaliance	Head, Composite Materials and Structures Group	6304
Dr. E.A. Metzbower	Head, Physical Metallurgy Branch	6320
Dr. T. Wieting	Head, Directed Energy Effects Branch	6330
Dr. S.A. Wolf	Head, Materials Physics Branch	6340
Dr. K. Hathaway	Head, Multifunctional Materials Branch	6350
Dr. G. Huber	Head, Surface Modification Branch	6370
Dr. D.A. Papaconstantoupou	los Head, Complex Systems Theory Branch	6390

Point of contact: Ms. M. Daley, Code 6300A, (202) 767-2926

Laboratory for Computational Physics and Fluid Dynamics

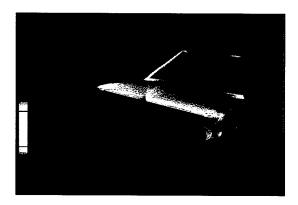
Code 6400 Research Activity Areas

Reactive Flows

Fluid dynamics in combustion Turbulence in compressible flows Multiphase flows Turbulent jets and wakes Turbulence modeling Computational hydrodynamics Propulsion systems analysis Contaminant transport modelling



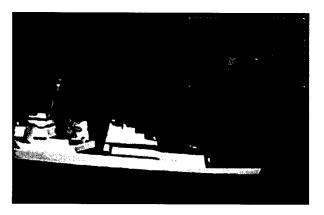
Olive (32P) and Snuffy (24P) - Origins at work



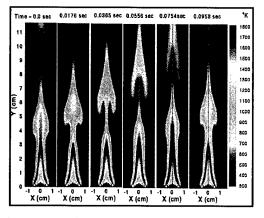
Simulation of flow past a Micro Air Vehicle. Computational Fluid Dynamics is being used to evaluate the aerodynamic performance of alternative concepts. This figure shows the pressure contours on the surface of the vehicle and a symmetry plane.

Computational Physics Developments

Laser plasma interactions
Inertial confinement fusion
Solar physics modeling
Dynamical gridding algorithms
Advanced graphical and parallel
processing systems
Electromagnetic and acoustic scattering
Microfluidics
Fluid structure interaction
Shock and blast containment



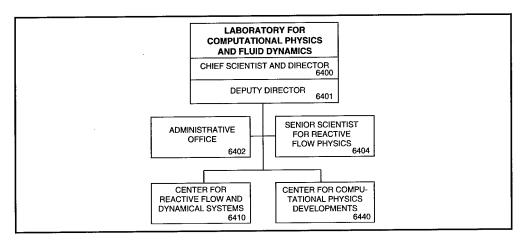
Simulation of temperature isocontours from unsteady airwake simulations over the DDG-51 destroyer were performed in a joint effort with NRL's Tactical Electronic Warfare Division (TEWD).



Temperature distributions from an unsteady simulation of a methanol liquid pool fire. Water mist suppression of such fires and the mechanisms involved have been elucidated using detailed reactive flow simulations.



Dr. J.P. Boris



The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the application of advanced analytical and numerical capabilities that are relevant to Navy, DoD, and other programs of national interest. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interaction including submarine and aerospace applications, atmospheric and solar geophysics, magnetoplasma dynamics for laboratory and space applications, application of parallel processing to large-scale problems such as unstructured grid generation for complex flows and target tracking and correlation for battle management, and in other disciplines of continuum and quantum computational physics as required to further the overall mission of the Naval Research Laboratory. The specific objectives of the Laboratory for Computational Physics and Fluid Dynamics are: to develop and maintain state-of-the-art analytical and computational capabilities in fluid dynamics and related fields of physics; to establish in-house expertise in parallel processing for large-scale scientific computing; to perform analyses and computational experiments on specific relevant problems using these capabilities; and to transfer this technology to new and ongoing projects through cooperative programs with the research divisions at NRL and elsewhere.

Personnel: 26 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.P. Boris Dr. W.C. Sandberg Mrs. C. Adams Dr. E.S. Oran Dr. K. Kailasanath Mr. J.H. Gardner, Jr.	Chief Scientist and Director Deputy Director Administrative Officer Senior Scientist for Reactive Flow Physics Head, Center for Reactive Flow and Dynamical Systems Head, Center for Computational Physics Developments	6400 6401 6402 6404 6410 6440

Point of contact: Mrs. C. Adams, Code 6402, (202) 767-6581

Plasma Physics Division

Code 6700 Research Activity Areas

Radiation Hydrodynamics

Pulsed-power radiation source and powerflow development

Materials plasma processing

Dense plasma atomic structure, processes, and equations of state

Radiation hydrodynamics of dense Z-pinches and laser-produced plasmas

Plasma-radiation diagnostics

Numerical simulation of high-density plasma

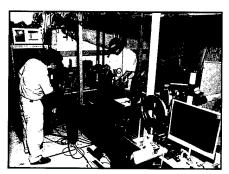
Laser Plasma

Nuclear weapons stockpile stewardship Laser fusion, inertial confinement Megabar high-pressure physics Rep-rate KrF laser development Strongly coupled plasmas

Charged Particle Physics

Radiation source development Electrodeless plasma discharges for lighting Applications of modulated electron beams Rocket, satellite, and shuttle-borne natural and active experiments

Laboratory simulation of space plasma processes



The NRL Table-Top-Terrawatt (T³) Laser Facility. The T³ laser currently operates at 0.4 ps, 2.5 TW and $5 \times 10^{18} \, \text{W/cm}^2$ and provides a facility to conduct research in intense laser-plasma interactions, intense laser-electron beam interactions, and intense laser-matter interactions.

Large area plasma processing sources Atmospheric and ionospheric GPS sensing Ionospheric radar diagnostics

Pulsed Power Physics

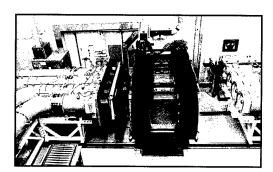
Production of intense relativistic electron and ion beams

Electron and ion beam propagation and focusing Ion beam inertial confinement fusion Materials modification by pulsed energy deposition Inductive and capacitative energy storage Plasma radiator source development

Beam Physics

Advanced accelerators and radiation sources Microwave, plasma, and laser processing of materials Microwave sources: Magnicons, gyrotrons, and CARMS

Ultra-high intensity laser-matter interactions
Free electron lasers and laser synchrotrons
Theory and simulation of space and solar plasmas
Ionospheric modification
Space weather modeling
Rocket and space diagnostics
Damage effects from laser-generated X-rays
Novel sources for active remote sensing

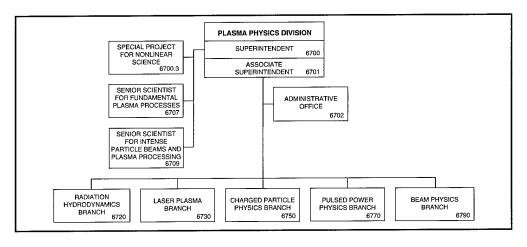


The NIKE Krypton Fluoride (KrF) Laser is in operation to study the physics issues of Direct Drive Inertial Confinement Fusion (ICF) for defense

and energy applications. Direct Drive with a KrF laser is a very attractive approach to ICF owing to its simplicity, inherent high efficiency, and very high-beam uniformity. The NIKE laser illuminates a flat target with intensities of up to 10¹⁴ W/cm² and beam nonuniformities of less than 0.25%. This photograph shows the largest amplifier in the laser. Light enters and exits the amplifier cell through the square aperture near the center of the photo. Amplification is achieved by exciting the krypton/fluorine mixture gas in the cell with two large area electron beams. One of the electron beam emitters (cathode) is in an exposed position to the left of the cell. The amplifier produces a 248 nm laser beam with total energy of 4-5 kJ.



Dr. S.L. Ossakow



The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory discharge, and space plasmas, intense electron and ion beams and photon sources, atomic physics, pulsed power sources, laser physics, advanced spectral diagnostics, and nonlinear systems. The effort of the Division is concentrated on a few closely coordinated theoretical and experimental programs. Considerable emphasis is placed on large-scale numerical simulations related to plasma dynamics; ionospheric, magnetospheric, and atmospheric dynamics; nuclear weapons effects; thermonuclear plasma confinement; atomic physics; plasma processing; nonlinear dynamics and chaos; free electron lasers and other advanced radiation sources; advanced accelerator concepts; and relativistic electron beam propagation. Areas of experimental interest include: relativistic electron beams, laser-plasma, laser-electron beam, and laser-matter interactions, thermonuclear fusion, electromagnetic wave generation, the generation of intense electron and ion beams, large area plasma processing sources, high-frequency microwave processing of ceramic materials, advanced accelerator development, inductive energy storage, laboratory simulation of space plasma phenomena, and in-situ and remote sensing space plasma measurements.

Personnel: 115 full-time civilian

Key Personnel

Name	Title	Code
Dr. S.L. Ossakow	Superintendent	6700
Dr. V.L. Patel	Associate Superintendent	6701
Dr. P. Palmadesso	Head, Special Project for Nonlinear Science	6700.3
Vacant	Administrative Officer	6702
Dr. W. Manheimer	Senior Scientist, Fundamental Plasma Processes	6707
Dr. M. Lampe	Senior Scientist, Intense Particle Beams and	
1	Plasma Processing	6709
Dr. J. Davis	Head, Radiation Hydrodynamics Branch	6720
Dr. S. Bodner	Head, Laser Plasma Branch	6730
Dr. R. Meger	Head, Charged Particle Physics Branch	6750
Dr. G. Cooperstein	Head, Pulsed Power Physics Branch	6770
Dr. P. Sprangle	Head, Beam Physics Branch	6790

Point of contact: Dr. V.L. Patel, Code 6701, (202) 767-2997

Electronics Science and Technology Division

Code 6800 Research Activity Areas

Electronic Materials

Preparation and development of magnetic, dielectric, optical, and semiconductor materials Electrical, optical, and magneto-optical studies of semiconductor microstructures and nanostructures, surfaces, and interfaces Impurity and defect studies

Structural and electronic properties of amorphous semiconductors

Condensed matter theory

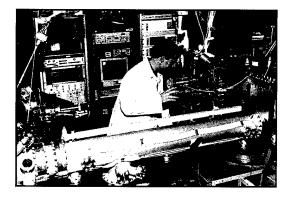
High magnetic field phenomena

Surface and Interface Sciences

Metal organic chemical vapor deposition
Surface and interface physics
Vacuum surface research
Processing research for nanometric electronics
Growth and characterization of micro- and nanosurfaces and interface structures
High-temperature superconductors

Microwave Technology

Microwave, millimeter-wave, and submillimeter-wave component and circuit research
Microwave and millimeter-wave integrated circuits
Surface acoustic wave devices
High-frequency device design, simulation, and fabrication
Ion implantation technology
Reliability and failure physics of electronic devices and circuits



Radiation Effects

Space experiments
Single event effects
Radiation tolerant ultra low power microelectronics
Ultra-fast charge collection
Environmental hazard remediation
Advanced photovoltaic technologies
Femtosecond laser research
Radiation effects in microelectronics and photonics
Material and device damage and hardening

Solid State Devices

Solid-state optical sensors
Radiation effects/hardening of electronic
devices, circuits, and optoelectronic sensors
Microelectronics device research and fabrication
Solid state circuits research
Signal processing research

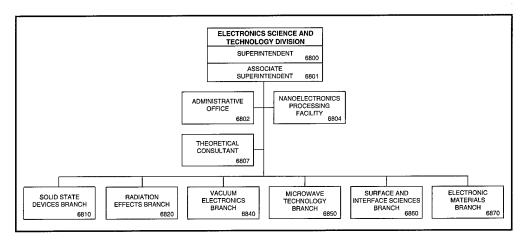
Vacuum Electronics

Microwave and millimeter power amplifier research and development
Cathode research and development
Thermionic energy conversion
Field emission arrays
Vacuum electronic devices
Tube fabrication and support technology

The EPICENTER specializes in molecular beam epitaxial growth of nanostructures created by alternating layers of narrow bandgap materials made available from four ultrahigh vacuum chambers. These structures are expected to improve the performance of far-infrared detectors, mid-wave lasers, and superhigh frequency transistors and resonant tunneling diodes. Here a scientist in the Electronics Science and Technology Division is shown creating a structure using high vacuum, chamber-to-chamber sample transfer.



Dr. G.M. Borsuk



The Electronics Science and Technology Division conducts programs of basic science and applied research and development in materials growth and properties, surface physics, micro- and nano- structure electronics, microwave techniques, microelectronic device research and fabrication, vacuum electronics, high-power microwave generation, and cryoelectronics, including superconductors. The activities of the Division couple device research both to basic materials investigations and to systems research and development needs.

Personnel: 148 full-time civilian

Key Personnel

Name	Title	Code
Dr. G.M. Borsuk	Superintendent	6800
Dr. K. Sleger	Âssociate Superintendent	6801
Mrs. Z. Basinger	Administrative Officer	6802
Dr. C.R.K. Marrian	Head, Nanoelectronics Processing Facility	6804
Dr. K.L. Ngai	Theoretical Consultant	6807
Dr. J.M. Killiany	Head, Solid State Devices Branch	6810
Dr. A.B. Campbell	Head, Radiation Effects Branch	6820
Dr. R.K. Parker	Head, Vacuum Electronics Branch	6840
Dr. D. Webb	Head, Microwave Technology Branch	6850
Dr. M. Peckerar	Head, Surface and Interface Sciences Branch	6860
Dr. B.V. Shanabrook	Head, Electronic Materials Branch	6870

Point of contact: Dr. K. Sleger, Code 6801, (202) 767-3894

Center for Bio/Molecular Science and Engineering

Code 6900 **Research Activity Areas**

Biologically Derived Microstructures

Self-assembly, molecular machining Synthetic membranes, molecular printing **Nanocomposites** Tailored electronic materials Low observables

Biosensors

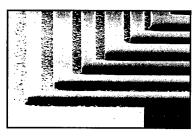
Binding polypeptides Cell-based biosensor DNA biosensor Fiber-optic biosensor Flow immunosensor Array-based sensors

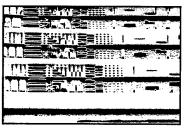
Environmental Quality

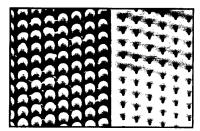
Oil/bilgewater separation Soil/groundwater explosives detection

> Injection molded patterned microtextured biopolymers are being fabricated from silicon templates, tools. These biodevices, which incorporate biomolecules (anti-

tions.







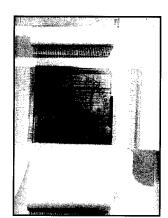
using lithographic materials are being explored for use in bodies and DNA) and biological cells for sensor and tissue engineering applicaAntifouling paint, controlled release Polyurethanase degradation Antisense DNA Heavy-metal detection Heavy-metal cleanup

Polymers and Liquid Crystals

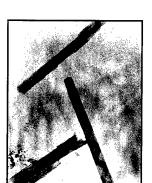
Ferroelectronic liquid crystals Advanced materials/information processing Flexible displays, noninvasive alignment technique

Surfaces and Interfaces

Uncooled IR detectors/imagers Submicron resists and microlithography Specifically activated thin films Neuronal patterning



NRL logo shown on a Flexible Liquid Crystal display. The resolution of the image is 100 dpi. The display is rugged, portable, and light weight. The applications being considered include handheld map reader and curved displays for cockpits.





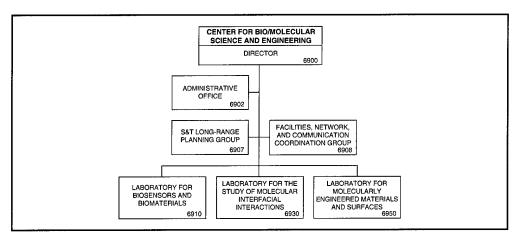
Portable flow immunosensor developed for on-site analysis of environmental contaminants in groundwater and soil

Electron micrograph of lipid tubules, showing one complete lipid bilayer surrounded by a helically wrapped partial bilayer. These self-assembled

microstructures have applications that include controlled release, field emitting cathodes, and electronic obscurants for low observables.



Dr. J.M. SCHNUR



The Center for Bio/Molecular Science and Engineering is using the tools of modern biology, physics, chemistry, and engineering to develop advanced materials and sensors. The long-term research goal is first to gain a fundamental understanding of the relationship between molecular architecture and the function of materials, then apply this knowledge to solve problems for the Navy and DoD community. The key theme is the study of complex bio/molecular systems with the aim of understanding how "nature" has approached the solution of difficult structural and sensing problems. Technological areas currently being studied include molecular and microstructure design, molecular biology, self-assembly, controlled release and encapsulation, and surface patterning and modification. Much of the research deals with the self-assembly of lipids, proteins, and liquid crystals into complex microstructures for use in advanced material applications, and the harnessing of the recognition functions of proteins and cells for the development of advanced sensors. A highly multidisciplinary staff is required to pursue these research and development programs. The Center provides a stimulating environment for cross-disciplinary programs in the areas of immunology, biochemistry, electrochemistry, inorganic and polymer chemistry, microbiology, microlithography, photochemistry, biophysics, spectroscopy, advanced diagnostics, organic synthesis, and electro-optical engineering.

Personnel: 38 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.M. Schnur	Director	6900
Ms. A. Kusterbeck	Assistant Director	6901
Ms. M. Shorb	Administrative Officer	6902
Mr. Dan Zebetakis	Head, Facilities, Network, and Communication	
	Coordination Group	6908
Dr. F.S. Ligler	Head, Laboratory for Biosensors and Biomaterials	6910
Dr. B.P. Gaber	Head, Laboratory for the Study of Molecular Interfacial	
	Interactions	6930
Dr. R. Shashidhar	Head, Laboratory for Molecularly Engineered Materials	
	and Surfaces	6950

Point of contact: Ms. M. Shorb, Code 6902, (202) 404-6015

Ocean and Atmospheric Science and Technology Directorate

OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE

Code 7000

The Ocean and Atmospheric Science and Technology Directorate performs research in the fields of acoustics, remote sensing, oceanography, marine geosciences, marine meteorology, and space science. Areas of emphasis in acoustics include advanced acoustic concepts and computation, environmental acoustics, acoustic signal processing, physical acoustics, acoustic systems, ocean acoustics, and acoustic simulation and tactics. Areas of emphasis in remote sensing include radio, infrared, and optical sensors, remote sensing physics and hydrodynamics, remote sensing simulation, and imaging systems. Areas of emphasis in oceanography include coastal and open ocean dynamics and prediction, coastal and open ocean processes, and remote sensing applications to oceanography.

Areas of emphasis in marine geosciences include marine physics, seafloor sciences, and mapping, charting, and geodesy. Areas of emphasis in marine meteorology include global, theater, and tactical scale prediction systems and forecast support. Areas of emphasis in space science include ultraviolet measurements, X-ray astronomy, upper atmospheric physics, gamma and cosmic rays, solar physics, and solar terrestrial relationships. Senior naval officers are assigned as military deputies to help maintain the directorate focus on operational Navy and other DoD requirements in these areas of emphasis. The directorate is responsible for administrative and technical support to major activities in Washington, DC, Stennis Space Center, Mississippi, and Monterey, California.

Associate Director of Research for Ocean and Atmospheric Science and Technology



Dr. E.O. Hartwig was born in Cincinnati, Ohio on November 22, 1946. He obtained his B.S. degree in biological sciences from the University of Texas at El Paso in 1968, and his Ph.D. from Scripps Institution of Oceanography in 1974. After completing his graduate studies, Dr. Hartwig accepted a position as a researcher at the Scottish Marine Biological Association (SMBA) in Oban, Scotland, where he established a sea-going experimental marine microbiological effort.

In 1975, Dr. Hartwig returned to the U.S., accepting a position at the Chesapeake Bay Institute of Johns Hopkins University. His shallow water research concentrated on the

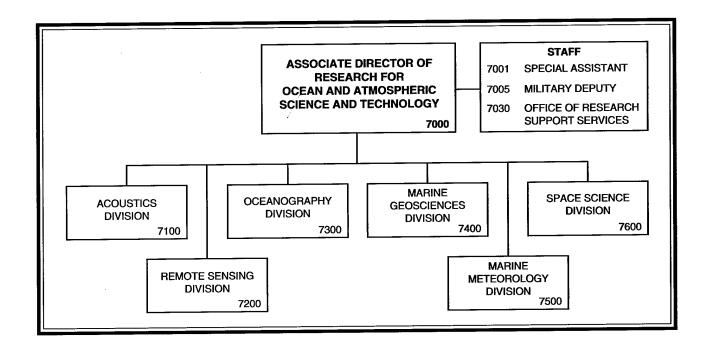
Chesapeake Bay and its outflow region, in active collaboration with many institutions and scientists. The efforts sought to understand the biological dynamics associated with the Bay's flow regimes, and studied the underlying water column and benthic biological processes resulting in the onset of the seasonal summer anoxia of the bay.

In 1978, Dr. Hartwig accepted a position at Marine Ecological Consultants (MEC), where his research centered on understanding the "before operations" environment at a nuclear generating station. In 1980, Dr. Hartwig accepted a position at the Lawrence Berkeley Laboratory (LBL) at the University of California at Berkeley to head up the biological component of a research team studying the concept of a proposed Ocean Thermal Energy Conversion (OTEC) plant. His work involved extensive interactions with engineers on the operating characteristics of the plant and physical oceanographers modeling flow regimes around the plant and to be generated by the plant.

Following his research at LBL, Dr. Hartwig joined the Office of Naval Research in 1982 as a scientific officer in the Oceanic Chemistry/Biology Program. When the program was split into an Oceanic Chemistry and Oceanic Biology Program, Dr. Hartwig became Program Manager of the Oceanic Biology Program. Here, Dr. Hartwig developed several major interdisciplinary research initiatives for the Navy.

In 1987, Dr. Hartwig was selected as Director of Ocean Sciences at ONR. He enhanced both university interactions with Ocean Sciences and the stature of ONR Ocean Science scientific officers and program managers in the Federal Government. Dr. Hartwig, working with the Oceanographer of the Navy, developed and implemented the Navy's academic research vessel rebuild program, which has resulted in fewer, more capable oceanographic vessels for the next millennium.

Dr. Hartwig joined NRL in October 1992 as Associate Director of Research for Ocean and Atmospheric Science and Technology. In 1996, Dr. Hartwig was presented the Presidential Rank Award of Meritorious Executive in the Senior Executive Service (SES).



Key Personnel

Name	Title	Code
Dr. E.O. Hartwig	Associate Director of Research for Ocean and Atmospheric	
b	Science and Techology	7000
Ms. S.K. Le	Special Assistant	70 01
Vacant	Military Deputy	7005
Mr. G.R. Bower	Head, Office of Research Support Services	7030
Dr. E.R. Franchi	Superintendent, Acoustics Division	7100
LCDR S.P. Sopko, USN	Naval Science (Acoustic) Research Coordinator	7105
Dr. P. Schwartz	Superintendent, Remote Sensing Division	7200
CDR R.T. Barock, USN	Military Deputy	720 5
Vacant	Superintendent, Oceanography Division	7300
CDR C.J. Hall, USN	Military Deputy	7305
Dr. H.C. Eppert, Jr.	Superintendent, Marine Geosciences Division	74 00
LCDR R. McDowell, USN*	Military Deputy	740 5
Dr. P.E. Merilees	Superintendent, Marine Meteorology Division	7500
LCDR C.A. Springer, USN	Military Deputy	7505
Dr. H. Gursky	Superintendent, Space Science Division	7600

Point of contact: Ms. L.M. Stanbery, Code 7000A, (202) 404-8174

^{*}Acting

Office of Research Support Services

Code 7030 Staff Activity Areas

Security Office

Information security
Physical security
Industrial security
AIS security
Personnel security
Classification
SCIF management
Security investigations

Operations Services Branch

Directives, reports, forms
Mail management
Navy message center
Classified material control
Facilities planning
Vehicles
Shipment via FedEx and common carriers

Safety/Environmental Office

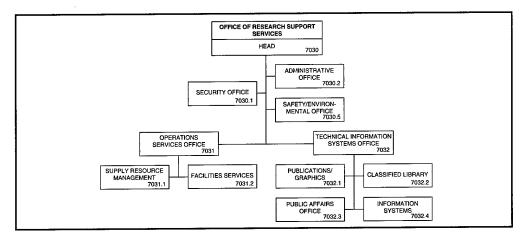
Industrial/laboratory safety Specialized safety training Hazard abatement Mishap prevention Hazardous materials program Hazardous waste disposal

Technical Information Systems Office

Scientific and technical information management Technical and classified library Technical editing, illustration, reproduction (color and black and white), printing Visual information, photographic services Community relations News releases **Exhibits** Information Conference coordination, video teleconferencing Freedom of Information Act Data communications Data networking Computer network maintenance Consulting and planning Supercomputing interface management Advanced communications testbed



Mr. G.R. Bower



The Office of Research Support Services is responsible for the operational and management support necessary for the day-to-day operations at NRL Stennis Space Center, Mississippi (NRL SSC). The Head of NRL SSC acts for the Commanding Officer in dealing with local Naval, federal, and civil activities and personnel on matters relating to NRL SSC support activities and facilities, community and multicommand issues, and safety and disaster control measures.

Support functions include security, public affairs, safety, information systems, and support services to include management and administration, facilities, and technical information.

Personnel: 27 full-time civilian

Key Personnel

Name	Title	Code
Mr. G.R. Bower	Head	7030
Mr. R.H. Swanton	Head, Security Office	7030.1
Ms. C.L. Gilroy	Administrative Officer	7030.2
Mr. K.H. Geistfeld	Head, Safety/Environmental Office	7030.5
Mr. W.B. Eslick	Head, Operations Services Office	7031
Ms. C.C. Wilkinson	Head, Supply Resource Management Unit	7031.1
Mr. W.B. Eslick	Head, Facilities Services Unit	7031.2
Mr. R.W. Burke	Head, Technical Information Systems Office	7032
Ms. M.H. Banker	Head Publications/Graphics Unit	7032.1
Ms. J.P. Ratliff	Head, Classified Library	7032.2
Ms. M.P. Rotundo	Head, Public Affairs Unit	7032.3
Mr. R.W. Burke	Head, Information Systems Unit	7032.4

Point of contact: Mr. G.R. Bower, Code 7030, (228) 688-4010; DSN 485-4010

^{*}Acting

Acoustics Division

Code 7100 Staff Activity Areas

Special programs management System concepts and studies

USN Journal of Underwater Acoustics

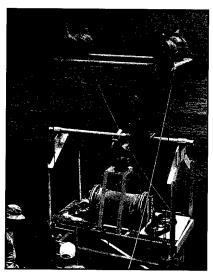
Research Activity Areas

Acoustic Signal Processing

Random media propagation
Limits of acoustic array performance
Underwater acoustic communications
Undersea noise signal characterization and
modeling
Surf zone noise generation
Shallow water acoustic surveillance methods
Fish absorption of acoustic signals
Geophysical inversion
Matched field processing and inversion
High-frequency acoustic flow visualization

Physical Acoustics

Structural acoustics
Active sound control
Fiber-optic acoustic sensors
Acoustics of coatings
Dynamics of complex structures
Target strength/radiation modeling
Acoustic transduction
Inverse scattering



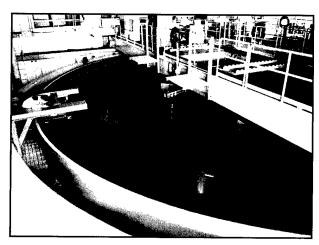
Deployment of high-frequency acoustics tower

Acoustic Systems

Ocean boundary scattering
Shallow water active classification
Statistical characterization of reverberation
Active sonar performance modeling
Matched field processing
Acoustic inversion techniques
Acoustic propagation
Nonlinear signal propagation
Acoustics of bubbly media
Tactical decision aids

Acoustic Simulation, Measurements, and Tactics

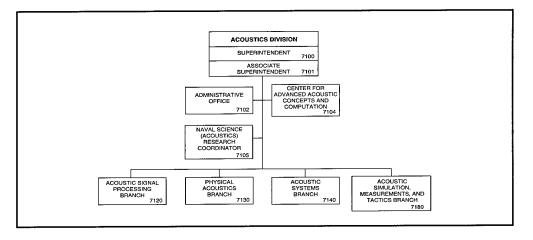
Wave propagation and scattering models
Ocean ambient noise models and simulation
Supercomputer acoustic models
Fleet application models and simulation
Tactical oceanography simulations
Warfare effectiveness studies
Environmental assessments
High-frequency acoustics
Coastal acoustics
Biologic volume reverberation
Shallow-water acoustics
Artic environemntal acoustic
Seafloor scattering



Structural acoustic studies in the one-million gallon Acoustic Holographic Pool Facility



Dr. E.R. Franchi



The Acoustics Division conducts basic and applied research in undersea physics. The basic research areas are signal processing; ocean acoustics and the associated description of the ocean environment as it impacts advanced systems; and physical acoustics. The applied spectrum includes developing and proving system concepts; signal processing for active and passive detection, tracking, and classification of underwater targets; echo strength; structural acoustics; large area assessment techniques; and development of processing systems and techniques. Also included are basic and applied research in simulations and tactics as influenced by the environment. The Division program is interactive with the ONR Contract Research Program and other research laboratories, both U.S. and foreign.

Personnel: 127 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Dr. E.R. Franchi	Superintendent	7100
Vacant	Associate Superintendent	7101
Mrs. N.J. Beauchamp	Administrative Officer	7102
Vacant	Head, Center for Advanced Acoustic Concepts	
	and Computation	7104
LCDR S.P. Sopko, USN	Naval Science (Acoustics) Research Coordinator	7105
Dr. M.H. Orr	Head, Acoustic Signal Processing Branch	7120
Dr. J.A. Bucaro	Head, Physical Acoustics Branch	7130
Mr. L.B. Palmer	Head, Acoustic Systems Branch	7140
Dr. S.A. Chin-Bing	Head, Acoustic Simulation, Measurements, and Tactics Branch	7180

Point of contact: Dr. E.R. Franchi, Code 7100, (202) 767-3482

Remote Sensing Division

Code 7200 Research Activity Areas

Remote Sensing

Sensors

SAR

Imaging RAR

Passive microwave imagers

CCDs and focal plane arrays

Fabry-Perot spectrometers

Imaging spectrometers

Optical interferometers

Spaceborne and airborne systems

Areas

Radiative transfer modeling

Coastal oceans

Marine ocean boundary layer

Polar ice

Middle atmosphere

Global ocean phenomenology

Environmental change

Ocean surface wind vector

Astrophysics

Optical interferometry

Radio interferometry

Fundamental astrometry and reference frames

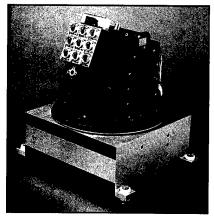
Star formation

Stellar atmospheres and envelopes

Interstellar medium, interstellar scattering

Pulsars

Low-frequency astronomy



Optical Head Assembly (OHA) of the Polar Ozone and Aerosol Measurement (POAM-II) experiment payload

Physics of Atmospheric/Ocean Interaction

Mesoscale, fine-structure, and microstructure Aerosol and cloud physics Mixed layer and thermocline applications Sea-truth towed instrumentation techniques Turbulent jets and wakes

Nonlinear and breaking ocean waves

Stratified and rotating flows

Turbulence modeling

Boundary layer hydrodynamics

Marine hydrodynamics

Computational hydrodynamics

Imaging Research/Systems

Remotely sensed signatures analysis/simulation Real-time signal and image processing

algorithm/systems

Image data compression methodology

Image fusion

Automatic target recognition

Scene/sensor noise characterization

Image enhancement/noise reduction

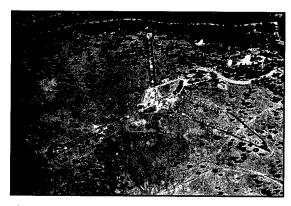
Scene classification techniques

Radar and laser imaging systems studies

Coherent/incoherent imaging sensor exploitation

Numerical modeling simulation

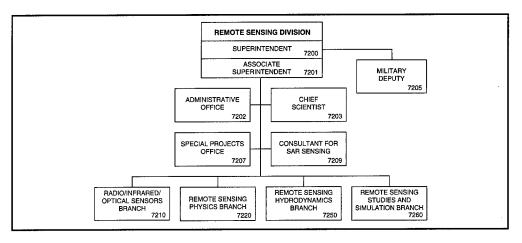
Environmental imagery analysis



The Navy Prototype Optical Interferometer produces the highest angular resolution images ever made at optical wavelengths. Its four astrometric elements (the rectangular huts) provide extremely precise star positions for use by the U.S. Naval Observatory in navigation and time keeping. The imaging elements are mounted on piers extending out the "Y" configuration. Light from all the telescopes is carried down evacuated pipes and combined in the optics laboratory to produce images of stellar surfaces.



Dr. P.R. SCHWARTZ



The Remote Sensing Division conducts a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets on the Earth, in the near-Earth environment, and in deep space. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to target and background emission and to absorption and emission by the intervening medium. The accomplishment of this research requires the development of sensor systems technology. The development effort includes active and passive sensor systems to be used for the study and analysis of the physical characteristics of phenomena that give rise to naturally occurring background radiation, such as that caused by the Earth's atmosphere and oceans, as well as man-made or induced phenomena such as ship/submarine hydrodynamic effects. The research includes theory, laboratory, and field experiments leading to ground-based, airborne or space systems for use in such areas as remote sensing, astrometry, astrophysics, surveillance, nonacoustic ASW, and improved meteorological support systems for the operational Navy. Special emphasis is given to developing space-based platforms and exploiting existing space systems.

Personnel: 99 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Dr. P.R. Schwartz Mr. C. Hoffman Mrs. M.K. Smith Vacant CDR R.T. Barock, USN Dr. D.T. Chen	Superintendent Associate Superintendent Administrative Officer Chief Scientist Military Deputy Head, Special Projects Office	7200 7201 7202 7203 7205 7207
Dr. S.A. Mango Dr. L. Rickard Dr. R. Bevilacqua Dr. R. Mied Dr. G.A. Keramidas	Consultant for SAR Sensing Head, Radio/Infrared/Optical Sensors Branch Head, Remote Sensing Physics Branch Head, Remote Sensing Hydrodynamics Branch Head, Remote Sensing Studies and Simulation Branch	7209 7210 7220 7250 7260

Point of contact: Dr. P.R. Schwartz, Code 7200, (202) 767-2351

Oceanography Division

Code 7300 Staff Activity Areas

Special studies

Research Activity Areas

Ocean Dynamics and Prediction

Ocean prediction

Large scale

Arctic

Shipboard

Data assimilation

Coastal and semi-enclosed sea

Ocean observing system simulation

Coastal scene generation

Ocean Sciences

Mesoscale dynamics Coupled systems

Air sea interaction

Biodynamics

Bio-optical models

Small scale dynamics
Small scale turbulence

Bubbles/waves

Optics

Remote Sensing Applications

Remote sensor algorithm development

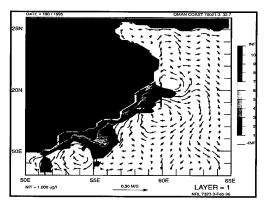
Color/hyperspectral applications High resolution littoral characterization

Remote sensor applications to biological processes

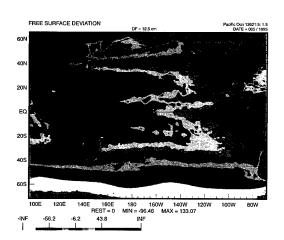
Satellite oceanographic tactical applications



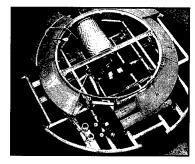
Optical mooring equipment for shallow water showing attenuation and absorption meters and irradiance sensors



Gulf of Mexico NOAA AVHRR Sea Surface Temperature Image illustrating the mesoscale and shelf processes. The position of the warm Loop current (dark) is shown in the eastern gulf. NRL collects and processes all AVHRR and SeaWifs imagery to understand the dynamics and evolution of oceanographic events that affect our coastal waters. Imagery can be viewed on the NRL, SSC website.



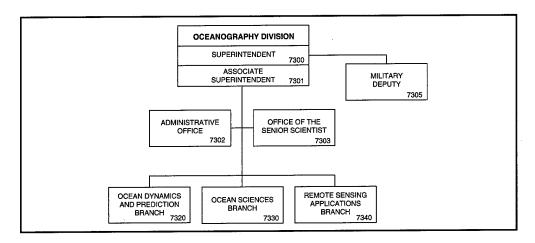
NRL layered ocean model output of sea surface height for Pacific Ocean, 5 January 1995. This model has been transitioned to FNMOC .



NRL's ten 300 kHz ADCPs are matched with trawl-resistant bottom mounts. This photo shows a bottom mount with its exterior fiberglass shell and some internal buoyancy segments removed. The internal recording instruments collect frequent profiles of

horizontal current for intervals of up to several months. A wave and tide gauge may also be included in the housing. With an operating depth of 300 m, the instruments permit operations nearly every-where on the world's continental shelves.





The Oceanography Division conducts basic and applied research in biological, physical, and dynamical processes and their description and modeling in open ocean, coastal, and semi-enclosed seas; exploiting satellite and airborne sensors for environmental information; investigation and application of microbiological processes to Navy problems. The oceanographic research is both theoretical and experimental in nature and is focused on understanding and modeling ocean, coastal, and littoral area hydro/thermodynamics, circulation, waves, ice dynamics, air-sea exchange, optics, and small and microscale processes. Analytical methods and algorithms are developed to provide quantitative retrieval of geophysical parameters of Navy interest from state-of-the-art sensor systems. The Division work includes analysis of biological processes that mediate and control bioluminescence distributions in the oceans, coastal, and littoral regions and microbially induced corrosion/metal microbe interaction. The Division programs are designed to be responsive to and to anticipate Naval needs. Transition of Division products to the Department of Defense (DoD), Navy systems developers, operational Navy and civilian (dual use) programs is a primary goal. The Division's programs are coordinated and interactive with other NRL programs and activities, ONR's research programs, and other government agencies involved in oceanographic activities. The Division also collaborates and cooperates with scientists from the academic community and other U.S. and foreign laboratories.

Personnel: 84 full-time civilian; 1 full-time military

Key Personnel

Name	Title	Code
Vacant	Superintendent	7300
Dr. E.M. Stanley	Âssociate Superintendent	7301
Mrs. I.S. DeSpain	Administrative Officer	7302
Dr. B.J. Little	Head, Office of the Senior Scientist	7303
CDR C.J. Hall, USN	Military Deputy	7305
Dr. J.M. Harding	Head, Ocean Dynamics and Prediction Branch	7320
Mr. S. Payne	Head, Ocean Sciences Branch	7330
Dr. W. Campbell	Head, Remote Sensing Applications Branch	7340

Point of contact: Mrs. I.S. DeSpain, Code 7302, (228) 688-4114; DSN 485-4114

Marine Geosciences Division

Code 7400 Research Activity Areas

Marine Geology

Sedimentary processes
Foreshore sediment transport
Pore fluid flow
Diapirism, volcanism, faulting, mass movement
Sediment geochemistry
Hydrate distribution, formation and dissociation

Marine Geophysics

Seismic wave propagation
Earthquake seismology
Physics of low-frequency acoustic propagation
Acoustic energy interaction with topography
and inhomogeneities
Detection, localization, and characterization
of events
Geomagnetic modeling

Marine Geotechnique

Sediment classification Sediment microfabric Geoacoustic modeling Geotechnical properties of sediments

Mapping and Charting

Digital database design
Digital product analysis and standardization
Data compression techniques and exploitation
Hydrographic survey techniques
Bathymetry extraction techniques from remote
and acoustic imagery
Utility software development for digital mapping
databases
Observation and modeling of nearshore
morphodynamics

In situ and Laboratory Sensors

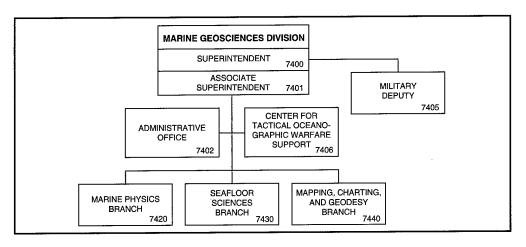
High-resolution subseafloor 2-D and 3-D seismic imaging
Laser/hyperspectral bathymetry/topography
Swath acoustic backscatter imaging
Sediment pore water pressure
Compressional and shear wave velocity
Airborne geophysics, gravity, and magnetics
Seafloor magnetic fluctuation
Sediment microfabric change with pore fluid and/or gas change



The Marine Geosciences Division has assisted in the development of video imagery field stations used to collect data on nearshore hydrodynamic and morphodynamic processes. These automated stations operate over long time periods (from weeks to years) and present information useful to the military and to scientists in a variety of formats. This time exposure image from Camp Pendleton, CA shows the time-averaged pattern of waves breaking over two alongshore sandbars. Determination of the camera orientation relative to known ground control positions (using the dark circular targets) allows quantification of parameters such as bar position, beach width, dominant wave period, incidence angle, and alongshore current speed.



DR. H.C. EPPERT, JR.



The Marine Geosciences Division has responsibility for planning and executing a broad spectrum research, development, and technology program in marine geology, geophysics, geoacoustics, geotechniques, and mapping, charting, and geodesy (MC&G). The program is designed to provide necessary digital databases, geoacoustic and geophysical models, and simulations to support training, system design, performance prediction, and operational needs of the Navy.

The applied portion of the program is directed toward (1) quantitatively predicting the effects of the seafloor and associated geophysical, geomorphological, and geoacoustic variability on performance of present and emerging naval systems, operations, and plans, and (2) developing technology and techniques to rapidly acquire, process, and analyze MC&G (gravity, magnetics, and bathymetry) and other types of geological, geophysical, and geoacoustic information to meet existing digital database requirements of the Chief of Naval Operations (CNO), National Image and Mapping Agency (NIMA), and system commands.

The Division serves as the focal point in the Navy and Marine Corps for assessing and identifying MC&G requirements, including prototype digital MC&G products and product coordination. The program is keyed to and responsive to priorities identified by NRL, Office of Naval Research, CNO, the System Commands, and NIMA. Close coordination and interaction with the Warfare Centers is essential to the success of this program with transition of Division products to system developers and the operational Navy a primary goal. The Division program is coordinated and interactive with other NRL programs and activities, ONR's Research Program Department, NOAA, USGS, NSF, and other government agencies involved in seafloor activities. The Division collaborates and cooperates with scientists from the academic community, other U.S. and foreign laboratories, and industry.

Personnel: 71 full-time civilian; 1 full-time military

Key Personnel

Name.	Title	Code
Dr. H.C. Eppert, Jr.	Superintendent	7400
Dr. P.J. Valent	Associate Superintendent	74 01
Ms. C.L. Gilroy	Administrative Officer	7402
LCDR R. McDowell, USN*	Military Deputy	7405
Vacant	Director, Center for Tactical Oceanographic	
	Warfare Support	7406
Mr. H.S. Fleming	Head, Marine Physics Branch	7420
Mr. S.G. Tooma	Head, Seafloor Sciences Branch	7430
Mr. M.M. Harris	Head, Mapping, Charting, and Geodesy Branch	7440

Point of contact: Ms. Margaret Gill, Code 7400, (228) 688-44650; DSN 485-4650

^{*}Acting

Marine Meteorology Division

Code 7500 Research Activity Areas

Numerical Weather Prediction

Global Mesoscale On-scene Large eddy simulation Boundary layer Coastal Massively parallel computing

Coupled ocean/atmosphere/wave Tropical cyclones

Aerosols

Topographically forced flow

Data Assimilation

Optimum interpolation Variational analysis Quality control Synthetic soundings Remotely sensed data Physical initialization Direct radiance assimilation Radar data assimilation

Shipboard Support

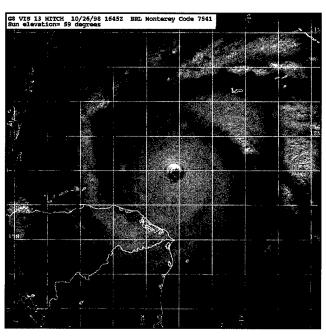
Tactical Environmental Support System Data fusion Visualization Port studies Typhoon havens Forecaster handbooks **Expert systems** CD-ROMs

Satellite Data/Imagery

Automated cloud classification Satellite imagery analysis Case study development Multisensor data fusion Tropical cyclone intensity Water vapor-tracked winds Cloud-tracked winds

Decision Aids

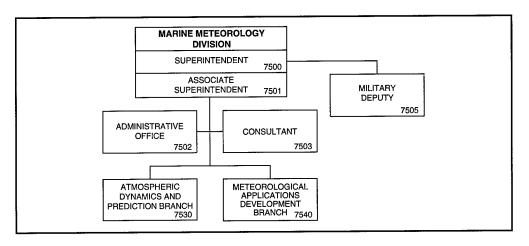
Refractivity Strike warfare Ship routing Fog/turbulence/icing Electromagnetic Electro-optical



Visible image for Hurricane Mitch on October 26, 1998 at 1645Z



Dr. P.E. MERILEES



The Marine Meteorology Division conducts a basic and applied research and development program designed to improve the basic understanding of atmospheric processes that impact Fleet operations and to develop information systems that analyze, simulate, predict, and interpret the structure and behavior of these processes and their effect on naval weapons systems. Basic research includes work in air-sea interaction, orographic and fetch-limited, atmospheric predictability and targeted observations, and aerosols. Applied research spans the gamut from development of both central-site and on-scene analysis/forecast systems, to the development of tactical decision aids for operations support. NRL-Monterey (NRL-MRY) is co-located with the Fleet Numerical Meteorology and Oceanography Center (FNMOC) and has developed and transitioned to FNMOC the global and mesoscale forecast models and satellite applications products that form the backbone of the Navy's worldwide weather forecasting capability. In addition, NRL is forging new ground by transitioning similar products and capabilities to the Navy's regionalized meteorology and oceanography centers around the globe. Specialties of the Division include numerical weather prediction, data assimilation and quality control, marine boundary layer processes, on-scene atmospheric environment assessment, environmental decision aids, database management, and satellite data interpretation and application.

Personnel: 63 full-time civilian; 3 full-time military

Key Personnel

Name	Title	Code
Dr. P.E. Merilees	Superintendent	7500
Ms. P. Phoebus	Associate Superintendent	7 501
Ms. C. Marks	Administrative Officer	7502
Dr. J. McCarthy	Consultant	7503
LCDR C.A. Springer, USN	Military Deputy	7505
Dr. R.M. Hodur	Head, Atmospheric Dynamics and Prediction Branch	7530
Dr. T.L. Tsui	Head, Meteorological Applications Development Branch	754 0

Point of contact: Dr. P.E. Merilees, Code 7500, (408) 656-4721; DSN 878-4721

Space Science Division

Code 7600 Research Activity Areas

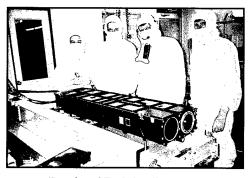
Space Weather and Atmospheric Physics

Remote sensing of the ionosphere and thermosphere
Middle atmospheric investigations
Global modeling
Upper atmospheric physics
Space astronomy
X-ray observation, analysis, and theory of space astronomical sources
Ultraviolet astronomy

Gamma-ray astrophysics, solar-flare gamma rays, and space cosmic ray particle environment

NRL SOHO/LASCO solar coronagraph image showing the progress of a coronal mass ejection (CME), which occurred on October 5, 1996. CMEs travel outward from the Sun with velocities on the order of 1000 km/s and frequently interact with the Earth's magnetosphere resulting in geomagnetic disturbances.





French and English colleagues assist NRL scientists preparing the LASCO wide-field coronagraph for flight on SOHO

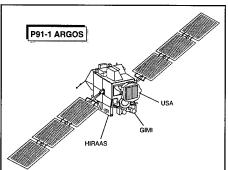
Solar Physics

Solar ultraviolet and visible light spectroscopy and photometry from rockets, satellites, and the Space Shuttle

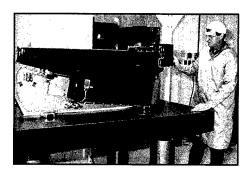
Solar-Terrestrial Relationships

Solar X-ray/EUV plasma diagnostics; coronal effects on Earth

Three Space Science Division experiments flew on the Air Force STP ARGOS satellite in early 1999. HIRAAS contains three ultraviolet spectroscopic instruments to study the Earth's thermosphere and ionosphere. GIMI consists of two electronic imaging cameras tuned to different EUV/FUV wavelength bands to obtain global data on the upper atmosphere as well as stars. USA is an X-ray timing and navigation experiment



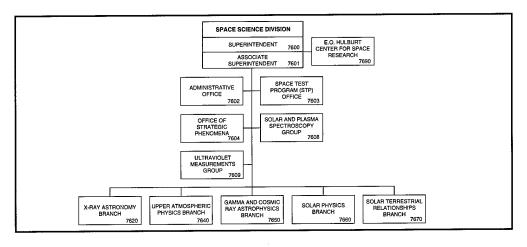
that will investigate the use of exotic astrophysical objects for autonomous time and position measurements.



The Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI) is an ultraviolet spectroscopy experiment developed in the Space Science Division as a Space Shuttle deployed payload. On Shuttle flight STS-66 in November 1994, MAHRSI provided the first global maps of hydroxyl (OH) and measured the gases in the middle atmosphere (35–120 km) that control the global distribution of ozone.



Dr. H. Gursky



The Space Science Division conducts research in the fields of astronomy and astrophysics, solar-terrestrial physics, and atmospheric science. Satellites, rockets, and ground-based facilities are used to obtain information on radiation from the Sun and celestial sources, and to study the behavior of the ionosphere and high atmosphere. Research results are of importance to radio communications, to use of the space environment, to weather prediction, and to the fundamental understanding of natural radiation and geophysical phenomena. The Superintendent also acts as Chief Scientist of the E.O. Hulburt Center for Space Research, created to provide research opportunities in space science to appointees from universities.

Personnel: 87 full-time civilian

Key Personnel

Name	Title	Code
Dr. H. Gursky	Superintendent	7600
Dr. F.J. Giovane	Associate Superintendent	7601
Mrs. B.M. Shea	Administrative Officer	7602
LT D.A. Bailey, USN	Space Test Program Officer, Kirtland AFB, NM	7603
Dr. H.M. Heckathorn	Head, Office of Strategic Phenomena	7604
Dr. U. Feldman	Head, Solar and Plasma Spectroscopy Group	7608
Dr. G. Carruthers	Head, Ultraviolet Measurements Group	7609
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch	7620
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch	7640
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch	7650
Dr. R.A. Howard	Head, Solar Physics Branch	7660
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch	7670
Dr. H. Gursky [†]	Chief Scientist, E.O. Hulburt Center for Space Research	7690
Dr. H. Friedman	Chief Scientist (Emeritus), E.O. Hulburt Center	
	for Space Research	7690

Point of contact: Mrs. B.M. Shea, Code 7602, (202) 767-3631

[†]Additional duty

Naval Center for Space Technology

NAVAL CENTER FOR SPACE TECHNOLOGY

Code 8000

In its role to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems that support naval missions, the Naval Center for Space Technology activities extend from basic and applied research through advanced development in all areas of interest to the Navy space program. These activities include developing spacecraft, systems using these spacecraft, and ground command and control stations. Principal functions of the Center include understanding and clarifying requirements, recognizing and prosecuting promising research and development, analyzing and testing systems to quantify their capabilities, developing operational concepts

that exploit new technical capabilities, system engineering to allocate design requirements to subsystems, and engineering development and initial operation to test and evaluate selected spacecraft subsystems and systems. The Center is a focal point and integrator for those divisions at NRL whose technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal and motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.

Director of Naval Center for Space Technology

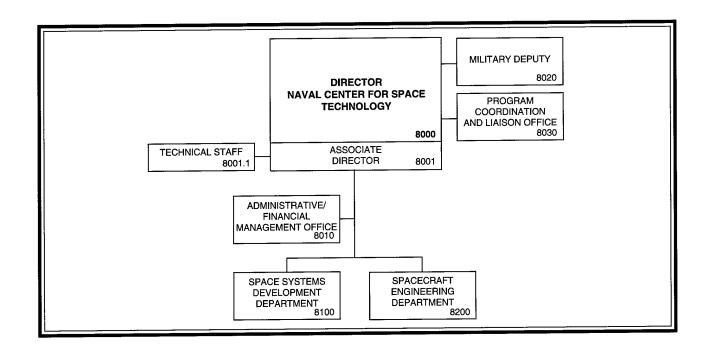


In P.G. Wilhelm was born in New York City on July 26, 1935. He attended Purdue University, where he received a B.S.E.E. degree in 1957. By 1961, he had completed all the course work for an M.S.E. degree from George Washington University.

From 1957 to 1959, Mr. Wilhelm served as an electrical engineer with Stewart Warner Electronics where he was assigned to a project to redesign the UPM-70, a Navy radar test set. In March 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined the Satellite Techniques Branch. In 1961, he became Head of the Satellite Instrument Section; in 1965, he

became Head of the Satellite Techniques Branch; and in 1974, Head of the Spacecraft Technology Center. In these positions, he performed satellite system design, equipment development, environmental testing, launch operations, and orbital data handling. In 1981, he was named the Superintendent of the Space Systems and Technology Division, the Navy's principal organization, or lead Laboratory, for space. He is credited with contributions in the design, development, and operation of 82 scientific and Fleet-support satellites. He has been awarded five patents. In October 1986, he was appointed Director of the newly established Naval Center for Space Technology. The Center's mission is to "preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems which support naval missions."

Mr. Wilhelm has been recognized with numerous awards including the Navy's Meritorious Civilian Service Award, the Distinguished Civilian Service Award, the Presidential Meritorious Executive Award, the Institute of Electrical and Electronics Engineers Aerospace and Electronic Systems Group Man of the Year Award, the NRL E.O. Hulburt Annual Science and Engineering Award, the Dexter Conrad Award, the Rotary National Stellar Award, and in May 1999 Mr. Wilhelm received the American Institute of Aeronautics and Astronautics (AIAA) Goddard Astronautics Award. He also has been elected a Fellow of the Washington Academy of Sciences and a Fellow of the American Institute of Aeronautics and Astronautics, and in 1997 was elected to the National Academy of Engineering. Mr. Wilhelm is also the first recipient of a new NRL award, the R.L. Easton Award, for excellence in engineering.



Key Personnel

Name	Title	Code
Mr. P.G. Wilhelm	Director, Naval Center for Space Technology	8000
Mr. F.V. Hellrich	Associate Director	8001
1411. 2 1 101111011	Technical Staff	8001.1
Mrs. B.L. Fleming	Head, Administrative/Financial Management Office	8010
LCDR J. Legaspi	Military Deputy	8020
Mr. P. Regeon	Head, Program Coordination and Liaison Office	8030
Mr. R.E. Eisenhauer	Superintendent, Space Systems Development Department	8100
Mr. H.E. Senasack	Superintendent, Spacecraft Engineering Department	8200

Point of contact: Mr. F.V. Hellrich, Code 8001, (202) 767-6549

Space Systems Development Department

Code 8100 Research Activity Areas

Advanced Space Systems Technologies

Space systems architectures and requirements Advanced payloads and optical systems Controllers, processors, and signal processing Data management systems and equipment Embedded algorithms and software

Astrodynamics

Orbit determination, performance assessment and verification

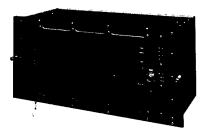
Computer simulation of space systems Orbit and attitude dynamics

Autonomous navigation, star catalog development GPS space applications and geolocation systems Mission analysis, operations and satellite coverage studies

Command, Control, Communications, Computers, and Intelligence

Communications theory and systems
Tracking, telemetry, and control systems
Satellite ground station engineering and implementation

Transportable and fixed ground antenna systems High-speed fixed and mobile ground data collection, processing, and dissemination systems Tactical communication systems



The Joint Combat Information (JCIT) uses advanced RF and digital technology to provide unprecedented battlefield connectivity and combat information

processing in a compact, modular, on-the-fly reconfigurable unit with an open system architecture. The JCIT contains up to eight multiband transceivers, embedded INFOSEC, message processing, date storage, crypto key management, GPS, and power supplies in a 19" rack mount or three-fourths ATR chassis weighing less than 50 lbs. It is capable of simultaneously transmitting, receiving, encrypting, decrypting, and processing voice and video information. The system is software reprogrammable to support a variety of mission scenarios and achieves much of its functionality and diversity through software. The design of the JCIT permits interoperability with legency systems as well as interservice, international, and coaliton partner systems. Having been designed for airborne (including carrier-based platforms) use, the JCIT is fully qualified for land, Naval surface and subsurface applications.

Space Electronic Systems Development

Space system concept definition, design, and implementation including hardware and software Detailed electrical/electronic design of electronic and electromechanical systems and components Implementation of real time flight software, and embedded command, control and telemetry software

Design and verification of real time embedded multiprocessor software Spacecraft antenna systems

Space systems fabrication, test, and integration Launch and on orbit support

Space test systems and electronic launch support equipment

Space Electronic Warfare

Design criteria for counter-surveillance and counter-targeting

Data search, analysis, and synthesis of information related to special sensor performance

Space Mission Development

Mission development and requirements definition Systems engineering and analysis Concepts of operations and mission simulations Mission evaluation and performance assessments

Space Surveillance, Navigation, and Time

Advanced navigation satellite technology
Precise Time and Time Interval (PTTI) technology
Atomic-time/frequency standards/instrumentation
Passive and active ranging techniques
Detection and precision tracking of orbiting objects
from space and ground

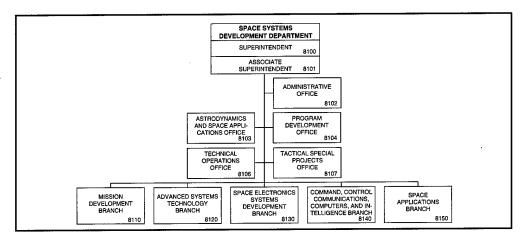


The "ICEBOX" is a trańsportable satellite communicatiions and relay station that has been deployed around the world in support of Naval operations. ICEBOX is transportable via a C141 Aircraft and can provide satellite communications and in-theater monitoring capabilities for a number of situations. ICEBOX has a number of innovative features that include remote operations and troubleshooting, automatic transmit and

receive, multifuncitonal antennas, and innovative processing techniques.



MR. R.E. EISENHAUER



Basic Responsibilities

The Space Systems Development Department (SSDD) is the space and ground support systems research and development organization of the Naval Center for Space Technology. The primary objective of the SSDD is to develop space systems to respond to Navy, DoD, and national mission requirements with improved performance, capacity, reliability, efficiency, and/or life cycle cost. The Department must derive system requirements from the mission, develop architectures in response to these requirements, and design and develop systems, subsystems, equipment, and implementation technologies to achieve the optimized, integrated operational space and ground system. These development responsibilities extend across the entire space/ground spectrum of hardware, software, and advanced technologies, including digital processing and control, analog systems, power, communications, command and telemetry, radio frequency, optical, payload, and electromechanical systems, as well as systems engineering.

Personnel: 245 full-time civilian

Key Personnel

Name Title .		Code
Mr. R.E. Eisenhauer	Superintendent	8100
Mr. G.E. Price	Associate Superintendent	8101
Ms. M.R. Hudson	Administrative Officer	8102
Mr. J. Middour	Head, Astrodynamics and Space Applications Office	8103
Mr. B.J. Lamb	Head, Program Development Office	8104
Mr. P. Nicholson	Head, Technical Operations Office	8106
Mr. M.T. Powell	Head, Tactical Special Projects Office	8107
Mr. D.L. Pettit*	Head, Mission Development Branch	8110
Mr. W.R. Webster	Head, Advanced Systems Technology Branch	8120
Mr. G.E. Flach	Head, Space Electronics Systems Development Branch	8130
Mr. G. Cooper	Head, Command, Control, Communications, Computers,	
1	and Intelligence Branch	8140
Mr. R.L. Beard	Head, Space Applications Branch	8150

Point of contact: Ms. M.R. Hudson, Code 8102, (202) 767-0432

^{*}Acting

Spacecraft Engineering Department

Code 8200 Research Activity Areas

Design, Test, and Processing

Design, fabrication, and testing of NCST spacecraft and hardware:

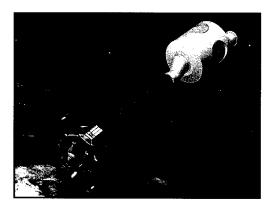
Preliminary and detailed design

Fabrication

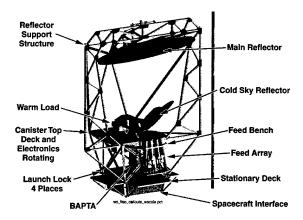
Testing

Integration onto launch vehicle

Systems engineering for new spacecraft proposals Start-to-finish responsibility for NCST spacecraft mechanical systems



NRL's Interim Control Module (ICM) will provide attitude control and reboost capability for the International Space Station.



WindSat demonstrates the use of Passive Microwave Polarimetry from space to measure the full ocean surface wind field (wind speed and direction).

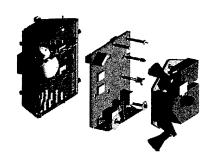
Systems Analysis

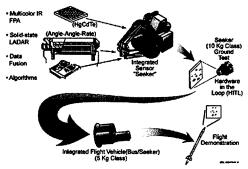
Development and maintenance of a highly competent staff and modern facilities
Research and development in spacecraft technology
Conceptual design trade studies
Integrated engineering design and analysis
Structural and thermal analysis
Development and transition of prototype hardware
Development and integration of experimental payloads

Control Systems

Attitude determination and control systems
Reaction control
Precision pointing
Propulsion systems
Analytical design and mission planning
Navigation, tracking, and orbit dynamics
Expert systems
Flight operations support
Computer simulation
Computer animation
Robotics engineering and control
Spaceborne robotics applications

Naval EarthMap Observer (NEMO) will provide Hyperspectral technology applications for coastal ocean and littoral imaging, resource monitoring, and mineral mapping.

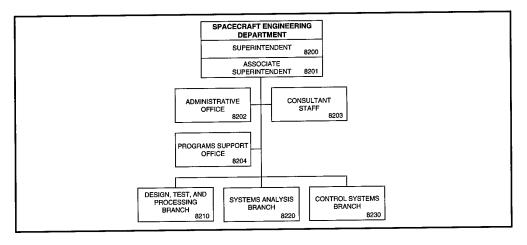




Discriminating Interceptor Technology (DITP) demonstrates technologies traceable to NMD and TMD applications to include miniaturized IR and LADAR sensors and sensor fusion processing hardware.



Mr. H.E. Senasack, Jr.



Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's capability to design and build spacecraft. Activities range from concept and feasibility planning to on-orbit IOC for the NRL's space systems.

The SED provides spacecraft bus expertise for the Navy and maintains an active in-house capability to develop satellites; manages Navy space programs through engineering support and technical direction; in concert with the Space Systems Development Department, designs, assembles and tests spacecraft and space experiments, including all aspects of space, launch, and ground support; analyzes and designs structures, mechanisms, and a variety of control systems, including attitude, propulsion, reaction, and thermal; integrates satellite designs, launch vehicles, and satellite-to-boost stages; functions as a prototype laboratory to ensure that designs can be transferred to industry and incorporated into subsequent satellite hardware builds; and consults with the Navy Program Office on technical issues involving spacecraft architecture, acquisition, and operation.

Personnel: 93 full-time civilian

Key Personnel

Name	Title	Code
Mr. H.E. Senasack, Jr. Mr. J.P. Schaub Ms. C. Gross Mr. A. Hull Ms. C. Warner* Mr. J.A. Hauser II Mr. M.A. Brown	Superintendent Associate Superintendent Administrative Officer Consultant mStaff Head, Programs Support Office Head, Design, Test, and Processing Branch Head, Systems Analysis Branch	8200 8201 8202 8203 8204 8210 8220
Mr. S.A. Hollander	Head, Control Systems Branch	8230

Point of contact: Mr. H.E. Senasack, Jr., Code 8200, 767-6411

^{*}Acting

Technical
Output,
Fiscal, and
Personnel
Information

Technical Output

Publications, Presentations, and Patents

The Navy continues to be a pioneer in initiating new developments and a leader in applying these advancements to military requirements. The primary means of informing the scientific and engineering community of the advances made at NRL is through the Laboratory's technical output—reports, articles in scientific journals, contributions to books, papers presented to scientific societies and topical conferences, patents, and inventions.

The figures for Calendar Years 1997 and 1998 presented below represent the output of NRL facilities in Washington, DC; Bay St. Louis, Mississippi; and Monterey, California.

In addition to the output listed, NRL scientists made more than 1,430 oral presentations during 1997 and 1,440 oral presentations during 1998.

In 1986, Congress enacted the Federal Technology Transfer Act in an effort to encourage the commercial use of technology developed in Federal laboratories. The Act allows Government inventors and the laboratories where they work to share the royalties generated by commercial licensing of their inventions. Also, the Act encourages the establishment of cooperative research and development agreements between laboratories such as NRL and nonfederal entities such as state and local governments, universities, and business corporations. Such cooperative R&D agreements can include the allocation in advance of patent rights on any inventions made under the joint research effort.

The 1986 Act has given additional impetus to the Laboratory's efforts to patent important inventions arising out of its various research programs.

Calendar Year 1997

Type of Contribution	Unclassified	Classified	Totai
Articles in periodicals, chapters in books,	•		
and papers in published proceedings	1,119	0	1,119*
NRL Formal Reports	19	17	36
NRL Memorandum Reports	116	. 14	130
Books	3	0	3
Patents granted	·		62
Statutory Invention Registrations (SIRs)			5

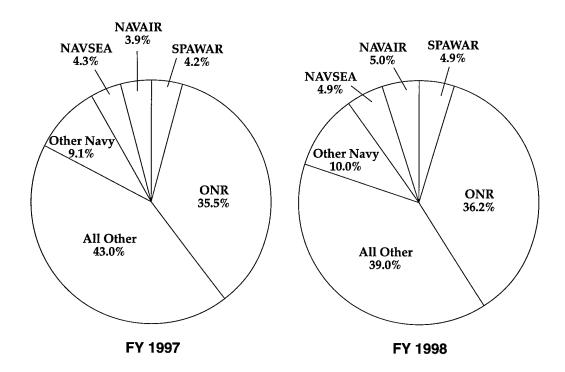
Calendar Year 1998

Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books,			
and papers in published proceedings	1,274	0	1,274**
NRL Formal Reports	26	3	29
NRL Memorandum Reports	96	9	105
Books	3	0	3
Patents granted	-		78
Statutory Invention Registrations (SIRs)			6
Statutory invention Registrations (SIRS)			ŭ

^{*}This is a provisional total based on information available to the Ruth H. Hooker Research Library and Technical Information Center on January 9, 1998. Additional publications carrying a 1997 publication date are anticipated.

^{**}This is a provisional total based on information available to the Ruth H. Hooker Research Library and Technical Information Center on January 26, 1999. Additional publications carrying a 1998 publication date are anticipated.

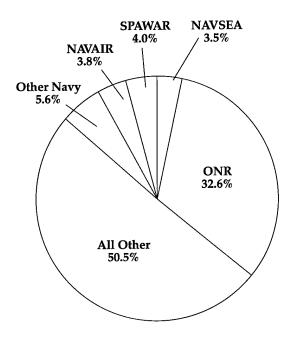
FY 1997/98 Sources of New Funds (Actual)



Source of Funds (%)

		\$M	
FY 1997	Reimbursable	Direct Cite	Total
Office of Naval Research (ONR)	225.5	57.1	282.6
Naval Sea Systems Command (NAVSEA)	21.2	13.2	34.4
Space and Naval Warfare Systems Command (SPAWAR)	21.3	12.0	33.3
Naval Air Systems Command (NAVAIR)	20.4	10.8	31.2
Other Navy	49.1	23.3	72.4
All Other	<u>228.8</u>	<u>113.3</u>	<u>342.1</u>
Total Funds	566.3	229.7	796.0
		\$M	
		ФІЛІ	
FY 1998	Reimbursable	Direct Cite	Total
FY 1998 Office of Naval Research (ONR)	Reimbursable 209.9	•	Total 261.5
		Direct Cite	
Office of Naval Research (ONR)	209.9	Direct Cite 51.6	261.5
Office of Naval Research (ONR) Naval Sea Systems Command (NAVSEA)	209.9 21.6	Direct Cite 51.6 13.3	261.5 34.9
Office of Naval Research (ONR) Naval Sea Systems Command (NAVSEA) Space and Naval Warfare Systems Command (SPAWAR)	209.9 21.6 23.9	51.6 13.3 11.7	261.5 34.9 35.6
Office of Naval Research (ONR) Naval Sea Systems Command (NAVSEA) Space and Naval Warfare Systems Command (SPAWAR) Naval Air Systems Command (NAVAIR)	209.9 21.6 23.9 19.5	51.6 13.3 11.7 16.8	261.5 34.9 35.6 36.3

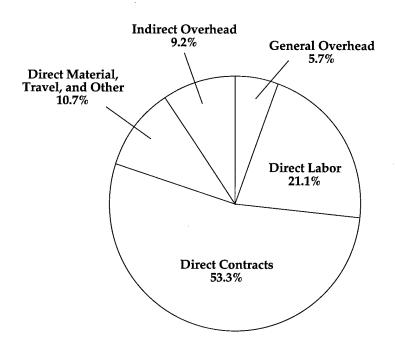
FY 1999 Sources of New Funds (Plan)



Source of Funds (%)

		\$M	
FY 1999	Reimbursable	Direct Cite	Total
Office of Naval Research (ONR)	222.0	28.4	250.4
Naval Sea Systems Command (NAVSEA)	16.4	10.1	26.5
Space and Naval Warfare Systems Command (SPAWAR)	21.9	8.9	30.8
Naval Air Systems Command (NAVAIR)	19.2	10.1	29.3
Other Navy	29.9	12.9	42.8
All Other	<u>208.5</u>	<u>179.6</u>	<u>388.1</u>
Total Funds	517.9	250.0	767.9

FY 1999 Distribution of New Funds (Plan)

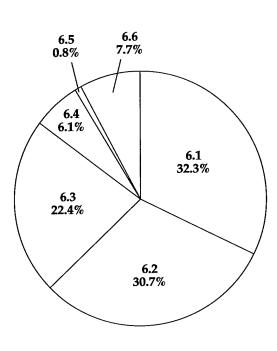


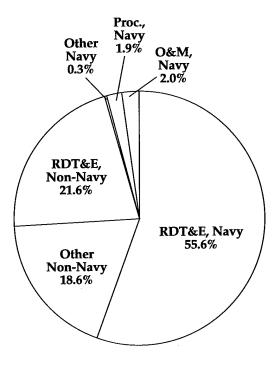
Distribution of Funds (%)

	\$M
Direct Labor	162.4
General Overhead	43.5
Indirect Overhead	70.7
Direct Material, Travel, and Other	82.3
Direct Contracts*	<u>409.0</u>
Total Funds	767.9

^{*}Direct contracts include reimbursable and direct citation funding.

FY 1999 Reimbursable New Funds by Category (Plan)





Distribution of RDT&E, Navy (%) (\$287.8)

Distribution of Reimbursable (%) (\$517.9)

		\$M	
Category	Navy	Non-Navy	Total
6.1 Research	93.1	2.9	96.0
6.2 Exploratory Development	88.2	22.8	111.0
6.3 Advanced Development	64.7	73.2	137.9
6.4 Engineering Development	17.5	4.9	22.4
6.5 Management and Support	2.3	1.0	3.3
6.6 Operational Systems Development	22.0	<u>7.3</u>	29.3
Subtotal RDT&E	287.8	112.1	399.9
Operation and Maintenance	10.5	4.2	14.7
Procurement	9.8	12.1	21.9
Other	1.3	80.1	81.4
Total Reimbursable Funds	309.4	208.5	517.9

Personnel Information*

Civilian

Full-Time, Permanent (FTP)

 Graded
 2617

 Ungraded
 127

 Total
 2744

Temporary, Part-Time, Intermittent (TPTI)

TPTI <u>308</u>

Total Civilian 3052

Graded FTP Breakdown

Scientists, Engineers, and SES
Administrative—Professional
Administrative—Management
Technicians
Other-Clerical
Other-General
Total

1576
228
238
238
248
258
2617

Civilian Budgeted

End-Strength 3041

Military

Officers 46 Enlisted 137

Total Military On-Board 183

Military Allowance 188

On-Board	Total Military	Total Civilian	FTP	TPTI	FTP Ungraded	FTP Graded
3358	183	3052	2744	308	127	2716

Annual Civilian Turnover Rate (%) (permanent employees only)

	1994	1995	1996	1997	1998
Research divisions	9.4	9.8	7.3	8.7	9.1
Nonresearch areas	9.1	9.2	9.8	8.6	12.3
Entire Laboratory	9.3	9.6	7.9	8.7	9.8

Highest Academic Degrees Held by Permanent Employees

Bachelors 589 Masters 401 Doctorates 839

^{*}Military numbers are current as of January 1999; figures include all NRL sites.

Numbers are current as of March 1999; figures include all NRL sites.

Civilian Budgeted End-Strength number is for FY 1999.

Professional Development

Professional Development

NRL has established programs for the professional and personal development of its employees so they may better serve the needs of the Navy. These programs develop and retain talented people and keep them abreast of advanced technology and management skills. Graduate assistantships, fellowships, sabbatical study programs, cooperative education programs, individual college courses, and short courses for personal improvement contribute to professional development.

Programs also exist for non-NRL employees. These programs enhance research efforts by providing means for non-NRL professionals to work at the Laboratory, thereby improving the interchange of ideas, meeting critical short-term technical requirements, and providing sources for new scientists and engineers. The programs include two-year graduate fellowships, faculty and professional interchanges, undergraduate work, and introducing gifted and talented high school students to the world of technology.

Programs for NRL Employees

During 1998, under the auspices of the Employee Development Branch, NRL employees participated in about 4,000 individual training events. Many of these were presented in-house courses on diverse technical subjects, computer software, management techniques, and enhancement of such personal skills as efficient use of time, project management, memory improvement, and interpersonal communications.

One common study procedure is for employees to work full time at the Laboratory while taking job-related scientific courses at universities and schools in the Washington area. The training ranges from a single course to full graduate-level programs. Tuition for training is paid by NRL. The formal programs offered by NRL are described below.

Graduate Programs

- The Advanced Graduate Research Program (formerly the Sabbatical Study Program, which began in 1964) enables selected professional employees to devote full time to research or pursue work in their own or a related field for one year at an institution or research facility of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all educational costs, travel, and moving expenses for the employee and dependents. Criteria for eligibility include professional stature consistent with the applicant's opportunities and experience, a satisfactory program of study, and acceptance by the facility selected by the applicant. The program is open to paraprofessional (and above) employees who have completed six years of Federal service, four years of which are required at NRL.
- The Edison Memorial Graduate Training Program enables employees to pursue advanced studies in their fields at local universities. Participants in this program work 24 hours each workweek and pursue their studies during the other 16

- hours. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate field, and professional standing in keeping with the candidate's opportunities and experience.
- To be eligible for the Select Graduate Training Program, employees must have a college degree in an appropriate field and must have demonstrated ability and aptitude for advanced training. Students accepted in this program devote a full academic year to graduate study. While attending school, they receive one half of their salary; and NRL pays for tuition, books, and laboratory expenses.
- The Naval Postgraduate School (NPS), located in Monterey, California, provides graduate programs to enhance the technical preparation of Naval officers and civilian employees who serve the Navy in the fields of science, engineering, operations analysis, and management. It awards a master of arts degree in national security affairs and a master of science degree in many technical disciplines.

NRL employees desiring to pursue graduate studies at NPS may apply for a maximum of six quarters away from NRL, with thesis work accomplished at NRL. Specific programs are described in the NPS catalog. Participants will continue to receive full pay and benefits during the period of study.

 Research conducted at NRL may be used as thesis material for an advanced degree.

This original research is supervised by a qualified employee of NRL who is approved by the graduate school. The candidate should have completed the required course work and should have satisfied the language, residence, and other requirements of the graduate school from which the degree is sought. NRL provides space, research facilities, and supervision but leaves decisions on academic policy to the cooperating schools.

Professional Development

NRL has programs, professional society chapters, and informal clubs that enhance the professional growth of employees. Some of these are listed below.

- The Congressional Fellowship Program, sponsored by the American Political Science Association, provides an opportunity for some of the most promising young, technically oriented Federal executives to participate in a variety of assignments designed to develop their knowledge and understanding of Congressional operations. These Fellows share activities with other members of the Congressional Fellowship Program who come mainly from journalism, law, and college teaching.
- The LEGIS Fellows Program provides assignments for personnel whose current or prospective positions may require working knowledge of the operations of the Congress. The Fellows receive instruction and hands-on experience in a Congressional office through training/developmental activities such as seminars, intensive briefings, and assignments on the staff of a member, committee, or support agency of the Congress in Washington, DC.
- The Counseling Referral Service (C/RS) helps employees to achieve optimal job performance through counseling and resolution of problems such as family, stress and anxiety, behavioral, emotional, and alcohol- or drug- related problems that may adversely impact job performance.

C/RS provides confidential assessments and short-term counseling, as well as training workshops and referrals to additional resources in the community. (Contact Dr. Ralph Surette at (202) 767-6857.)

• The NRL WISE Network, a merger of the NRL Women's S&T Network and the NRL WISE Chapter, is open to all professional women in science and engineering. The goal of this organization is to provide an environment for personal and professional growth. The organization sponsors projects that will lead to such an environment such as the NRL Mentor Program. In addition, informal monthly luncheon meetings and seminars are held. Distinguished female scientists and engineers are invited to discuss with the group their professional experience.

Members of the NRL WISE Network meet at noon the first Friday of each month at the science lounge in building 222. These brown bag luncheon meetings are open to all NRL female scientists and engineers, including contractors and postdoctoral associates. If you would like to be on the electronic mailing list, please send your e-mail address to Women@ccf.nrl.navy.mil in order to be notified with events and issues of interest. (For further information, contact the secretary of the NRL WISE Network, Dr. Elizabeth A. Dobisz at (202) 767-5159).

- Sigma Xi, the Scientific Research Society, encourages and acknowledges original investigation in scientific research. As an honor society for research scientists, individuals who have demonstrated the ability to perform original research are elected to membership in local chapters. The NRL-Edison Chapter, comprised of several hundred members, recognizes leadership research at NRL by presenting awards annually in pure and applied science to outstanding NRL staff members. The NRL-Edison Chapter also sponsors lectures at NRL on a wide range of scientific topics for the entire NRL community. These lectures are delivered by scientists from all over the nation and the world. The highlight of the Sigma Xi lecture series is the Edison Memorial Lecture, traditionally featuring a Nobel laureate. (Contact Dr. David van Keuren at (202) 767-4263.)
- The NRL Mentor Program was established to provide an innovative approach to professional and career training and an environment for personal and professional growth. It is open to all NRL employees in all job series and at all sites. Mentorees are matched with successful, experienced colleagues with more technical and/or managerial experience, who can provide them with the knowledge and skills needed to maximize their contribution to the success of their immediate organization, to NRL, to the Navy, and to their chosen career fields. The ultimate goal of the program is to increase job productivity, creativity, and satisfaction through better communication, understanding, and training. NRL Instruction 12400.1 established the NRL

Mentor Program, and it provides the policy and procedures for the program. (Contact Elaine Butler at (202) 767-6736.)

- The Charlotte Moore-Sitterly Chapter of Federally Employed Women, Inc. (FEW) was chartered at NRL in 1993. FEW is an international organization of federally employed women and men whose purpose is to eliminate sex discrimination and sexual harassment and enhance career opportunities for women in government. FEW works closely with other Federal agencies and organizations, including the Office of Personnel Management, Equal Employment Opportunity Commission, and Federal Women's Program subcommittees. (Contact Dr. Virginia Degiorgi at (202) 767-9027.)
- Employees interested in developing effective self-expression, listening, thinking, and leadership potential are invited to join either of two NRL chapters of **Toastmasters International**, the Thomas Edison Club or the Forum Club. Members of these clubs, who possess diverse career backgrounds and talents, learn to communicate not by rules but by practice in an atmosphere of understanding and helpful fellowship. NRL's Commanding Officer and the Director of Research endorse Toastmasters. (Thomas Edison Club: contact Jim Waldenfels at (202) 767-3003 or at his e-mail address, waldenfels@contracts.nrl.navy.mil; Forum Club: contact Mike Fromm at (202) 404-1389 or at his e-mail address, fromm@poama.nrl.navy.mil.

Continuing Education

NRL employees take government sponsored college courses (undergraduate and graduate) in order to improve their skills and keep abreast of current developments in their fields.

• The Human Resources Office (HRO) at NRL offers to all employees short courses in certain program areas that are not available at local schools; Laboratory employees may attend these courses at nongovernment facilities as well. Interagency courses in management, personnel, finance, supervisory development, clerical skills, and other areas are also available.

Other Programs

- The **Brookings Institution** offers a variety of seminars and conferences devoted to research, education, and publication on important issues of domestic and foreign policy.
- OPM's Management Development Center offers one- and two-week courses in intensive policy and management training for government managers and executives.
- The Excellence in Government Fellows Program is an extensive, year-long leadership

development opportunity to build the capacity of mid-level federal managers to lead organizations and produce results. As part of their fellowship year, participants develop strategies for meeting the complex challenges facing their organizations.

Technology Transfer

• The Office of Research and Technology Applications Program (ORTA) ensures the full use of the results of the Nation's federal investment in research and development by transferring federally owned or originated technology to state and local governments and the private sector. (Contact Dr. Catherine Cotell, Code 1004 at (202) 404-8411.)

Technology Base

• The Scientist-to-Sea Program (STSP) provides increased opportunities for Navy R&D laboratory/center personnel to go to sea for several days to gain first-hand insight into operational factors affecting system design, performance, and operations on a variety of ships.

For further information on the Technology Base Programs, contact Dr. Stephen Sacks, Code 5006, (202) 767-3666.

Equal Employment Opportunity (EEO) Programs

Equal employment opportunity is a fundamental NRL policy for all persons, regardless of race, color, sex, religion, national origin, age, or physical/mental handicap. The EEO office's major functions include affirmative action in employment, discrimination complaint process, EEO training, advice and guidance to management on EEO policy, and the following special emphasis programs:

- The Federal Women's Program (FWP) supports and enhances employment and advancement opportunities for women and addresses issues that affect women in the workplace.
- The Hispanic Employment Program (HEP) focuses on working with supervisors, managers, and subcommittees to recruit and place qualified Hispanics. The program is involved with Hispanic community organizations and local schools and provides activities specifically designed to offer information on employment and advanced education opportunities to Hispanics.
- The African-American Employment Program (AAEP) concentrates on recruiting, developing, and advancing African-American employees throughout NRL. It also encourages employees to achieve their maximum potential. The AAEP sponsors awareness programs with distinguished persons as guest lecturers.

- The Individuals with Disabilities Program (IWD) assists management to improve employment and advancement opportunities for qualified disabled employees. It also advises on accommodations necessary for disabled persons. The IWD recruits disabled students from colleges and universities for summer, co-op, and permanent positions in engineering and science.
- The Asian-American/Pacific Islander Program (API) identifies areas of concern regarding the recruitment, selection, advancement, retention, and utilization of API employees throughout NRL. The program interacts with API professional/community organizations to address employment concerns.
- The Federal Employment Opportunity Recruitment Program (FEORP) is designed to establish, maintain, and update targeted recruitment programs to reduce the conspicuous absence or manifest imbalance categories of NRL employment through innovative internal and external recruitment. In addition, it fosters relationships with minority and women's institutions and organizations.

Special programs are held during the year to promote an awareness of the contributions and capabilities of women and minorities. (Contact the EEO office at (202) 767-2486 for all EEO programs.)

Other Activities

• The Community Outreach Program traditionally has used its extensive resources to foster programs that provide benefits to students and other community citizens. Volunteer employees assist with and judge science fairs, give lectures, tutor, mentor, coach, and serve as classroom

- resource teachers. The program also sponsors African-American History Month art and essay contests for local schools, student tours of NRL, a student Toastmasters Youth Leadership Program, an annual holiday party for neighborhood children, a surplus computer transfer program, and an annual book drive to support school libraries. Through this program NRL has active partnerships with four District of Columbia, three Aberdeen, Maryland, and three Calvert County, Maryland, public schools. (Contact the Public Affairs Office at (202) 767-2541.)
- Other programs that enhance the development of NRL employees include four computer user groups (IBM PC, Mac, NeXT, and Sun) and the Amateur Radio Club. The Recreation Club accommodates the varied interests of NRL's employees with its numerous facilities, such as a refurbished 25-yard, 6-lane indoor swimming pool; basketball and volleyball courts; a weight room and exercise area; table tennis; meeting room; softball and basketball leagues; hot tubs; saunas; classes in five different types of martial arts; aerobics exercise; swimming, water aerobics, and water walking. The Showboaters, a nonprofit drama group that presents live theater for the enjoyment of NRL and the community, performs two major productions each year in addition to occasional performances at Laboratory functions and benefits for local charities. Though based at NRL, membership in Showboaters is not limited to NRL employees.



Programs for Non-NRL Employees

Several programs have been established for non-NRL employees. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping-stones to federal careers in science and technology. Their objective is to enhance the quality of the Laboratory's research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing the Laboratory's research, these programs acquaint participants with Navy capabilities and concerns.

Recent Ph.D., Faculty Member, and College Graduate Programs

- The National Research Council (NRC)/ NRL Cooperative Research Associateship Program selects associates who conduct research at NRL in their chosen fields in collaboration with NRL scientists and engineers. The tenure period is two years.
- The American Society for Engineering Education (ASEE) Postdoctoral Fellowship Program aims to increase the involvement of highly trained scientists and engineers in disciplines necessary to meet the evolving needs of naval technology. Appointments are for one year (renewable for a second and sometimes a third year). These competitive appointments are made by ASEE.
- The Consortium for Oceanographic Research and Education (CORE) Postdoctoral Fellowship Program. Administered in much the same way as the other two, this program selects associates to conduct research in ocean and atmospheric sciences only. The aim is to recruit more scientists and engineers in these specialized areas.
- The American Society for Engineering Education also administers the Navy/ASEE Summer Faculty Research Program for university faculty members to work for ten weeks with professional peers in participating Navy laboratories on research of mutual interest.
- The NRL/United States Naval Academy (USNA) Cooperative Program for Scientific Interchange allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty.
- The National Defense Science and Engineering Graduate Fellowship Program helps U.S.

citizens obtain advanced training in disciplines of science and engineering critical to the U.S. Navy. The three-year program awards fellowships to recent outstanding graduates to support their study and research leading to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer.

For further information about these six programs, please contact Mrs. Lesley Renfro at (202) 404-7450.

• The Professional Development Program for Ensigns assigns newly commissioned Ensigns who are awaiting future training to NRL, working in areas of their own choosing commensurate with their academic qualifications. These young officers provide a fruitful summer of research assistance, while gaining valuable experience in the Navy's R&D program.

For more information, contact the Military Administrative Office, LT Paul Simmons at (202) 767-7511.

Professional Appointments

- Faculty Member Appointments use the special skills and abilities of faculty members for short periods to fill positions of a scientific, engineering, professional, or analytical nature.
- Consultants and experts are employed because they are outstanding in their fields of specialization, or because they possess ability of a rare nature and could not normally be employed as regular civil servants.
- Intergovernmental Personnel Act Appointments temporarily assign personnel from the state or local government or educational institution to the federal government (or vice versa) to improve public services rendered by all levels of government.

High School/Undergraduate/Graduate College Student Programs

The student programs are tailored to the undergraduate and graduate students to provide employment opportunities and work experience in naval research. These programs are designed to attract applicants for student and full professional employment in fields such as engineering, physics, mathematics, and computer science. The student employment programs are designed to help students and the educational institutions gain a better understanding of NRL's research, its challenges, and its opportunities. The employment programs for college students include the following:

- The Student Career Experience Program (formerly known as Cooperative Education Program) employs students in study-related occupations. The program is conducted in accordance with a planned schedule and a working agreement between NRL, the educational institution, and the student. Primary focus is on students pursuing bachelor degrees in engineering, computer science, or the physical sciences.
- The Student Temporary Employment Program (STEP) enables students to earn a salary while continuing their studies and offers them valuable work experience.
- The Student Employment Program employs students for the summer in paraprofessional and technician positions in engineering, physical sciences, computer sciences, and mathematics.

• The **Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL.

For additional information on these undergraduate and graduate student programs, contact (202) 767-8313.

High School Programs

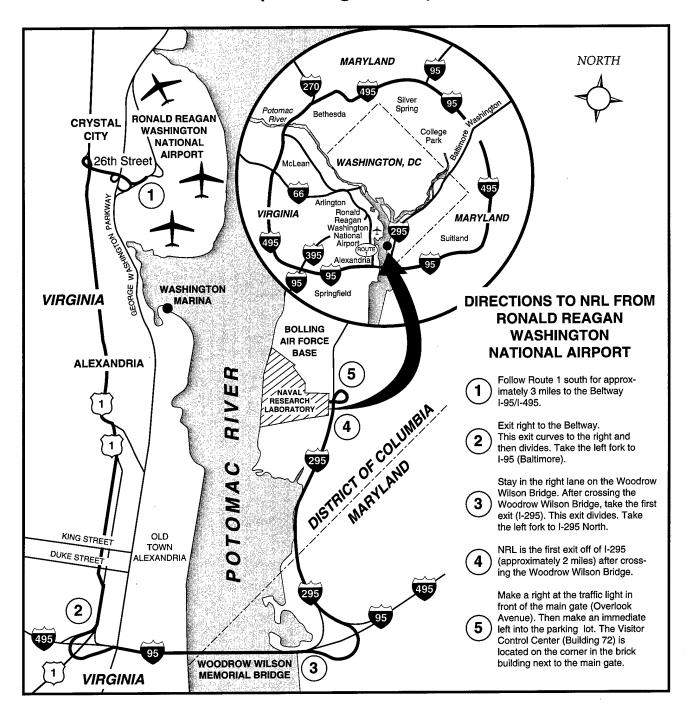
• The DoD Science & Engineering Apprentice Program (SEAP) employs high school juniors and seniors to serve for eight weeks as junior research associates. Under the direction of a mentor, students gain a better understanding of research, its challenges, and its opportunities through participation in scientific programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, and capacity for sustained hard work; a desire for a technical career; teacher recommendations; and achievement test scores. The NRL program is the lead program and the largest in DoD.

For additional information on these programs, please contact the Employee Development Branch (Code 1840) at (202) 767-2956.



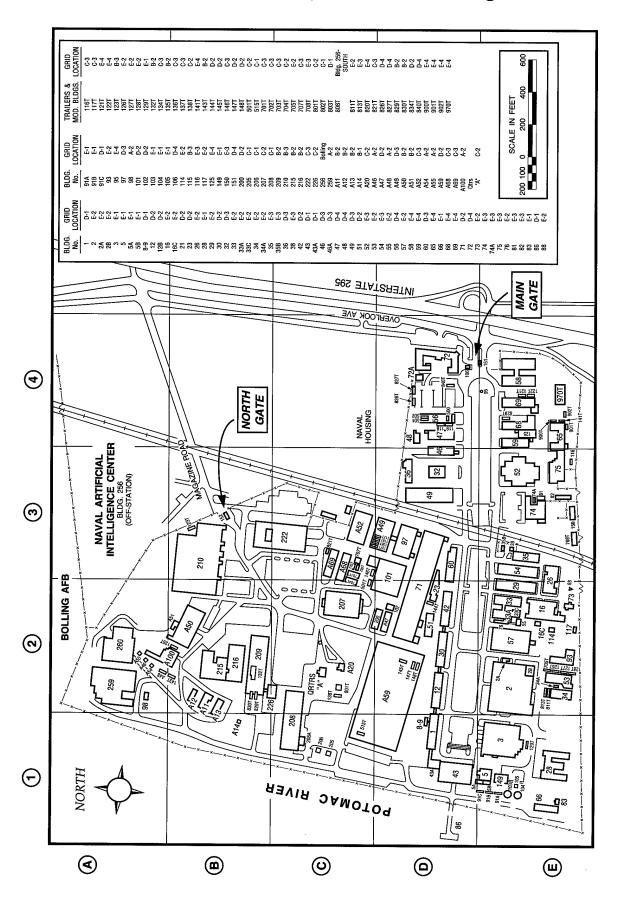
General Information

Naval Research Laboratory (Washington, DC)

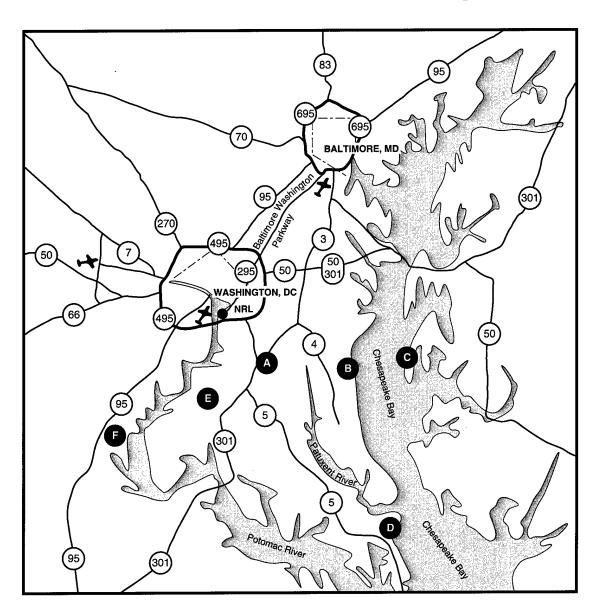


Naval Research Laboratory 4555 Overlook Avenue, SW Washington, DC 20375-5320 (202) 767-3200

Location of Buildings at NRL Washington

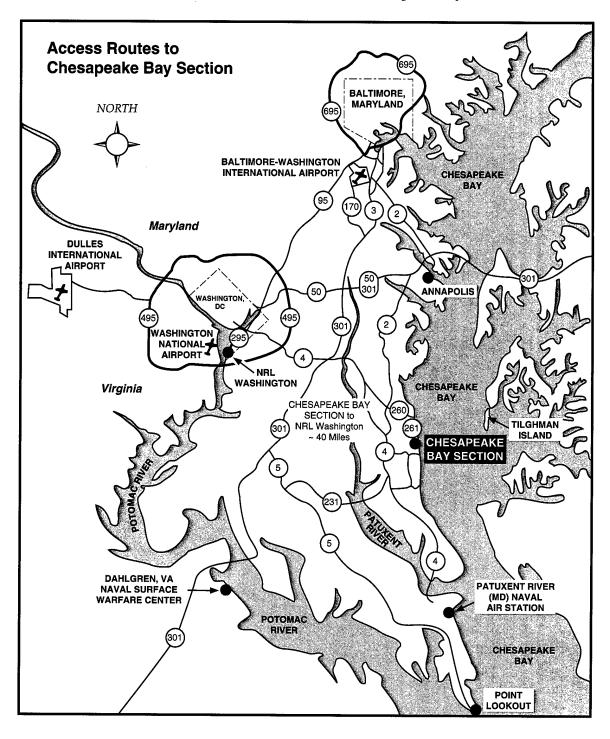


Location of Field Sites in the NRL Washington Area



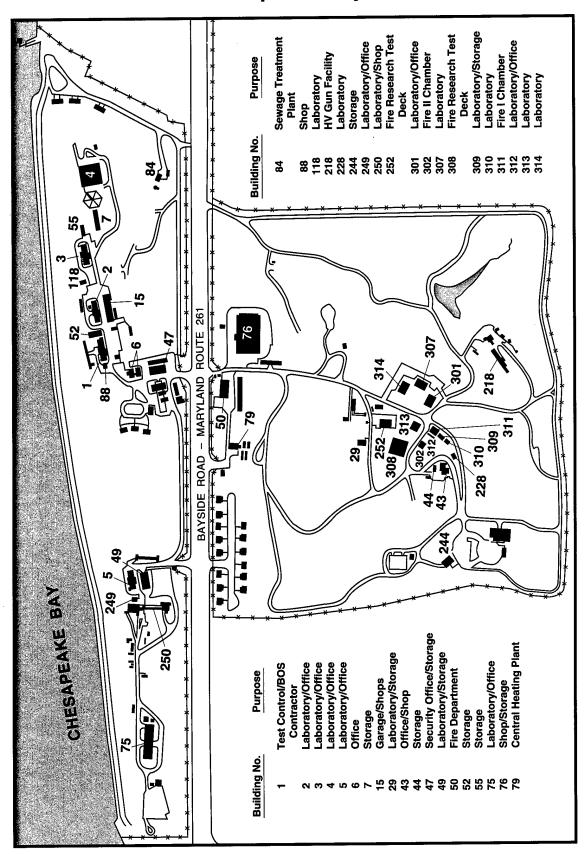
			Approximate	
			Mileage from	Cognizant
		<u>Location</u>	NRL Washington	<u>Code</u>
A	_	Brandywine, MD	28	5500
В	_	Chesapeake Bay Section, Chesapeake Beach, MD	40	3522
C	_	Tilghman Island, MD	110	3522
D	_	Patuxent River (MD) Naval Air Station	64	1600
Ε .	_	Pomonkey, MD	20	8106
F	_	Midway Research Center, Quantico, VA	38	8140

Chesapeake Bay Section (Chesapeake Beach, Maryland)

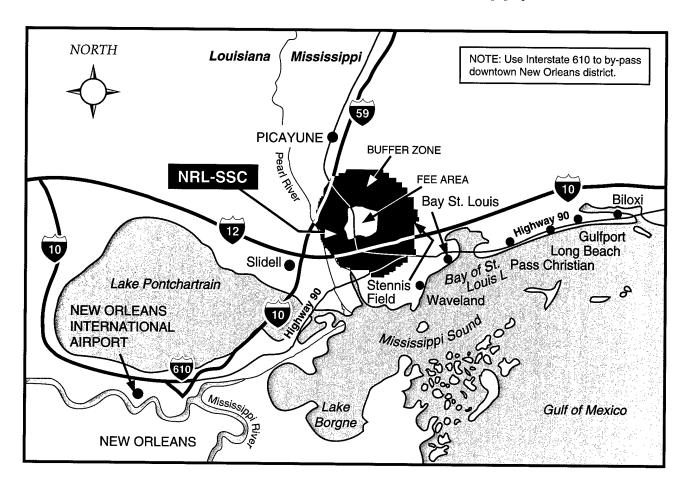


Naval Research Laboratory Chesapeake Bay Section 5813 Bayside Road Chesapeake Beach, MD 20732 (301) 257-4002

Location of Buildings at the Chesapeake Bay Section

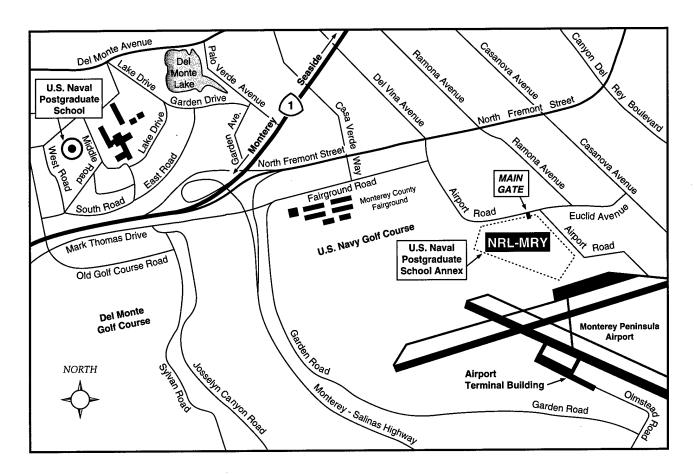


John C. Stennis Space Center (Stennis Space Center, Mississippi)



Naval Research Laboratory John C. Stennis Space Center Stennis Space Center, MS 39529-5004 (228) 688-3390

Naval Research Laboratory Monterey (Monterey, California)



Naval Research Laboratory Marine Meterology Division 7 Grace Hopper Avenue Monterey, CA 93943-5502 (408) 656-4721

Key Personnel

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6300	Superintendent, Materials Science and Technology Division	Dr. D.U. Gubser	(202) 767-2926			
6400	Chief Scientist and Director, Laboratory for Computational Physics					
(700	and Fluid Dynamics	Dr. J.P. Boris	(202) 767-3055			
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6800 6900	Superintendent, Electronics Science and Technology Division	Dr. G.M. Borsuk	(202) 767-3525			
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^{*}Acting

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REVIEWED AND APPROVED

CAPT B.W. Buckley USN Commanding Officer

June 1999

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